SEPTEMBER 2003
ISSUE #514
USA $3.95
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73 Amateur Radio Today

Simple Test Circuit Projects

Coat Hanger Dipole

Pocket-Portable Pulse Generator

Caribbean Mini-DX

73 Repaired My TV

Review: SG-2020 Xcvr.

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For Demanding Users Like You!

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QRX . . .

AAADD

That's Age-Activated Attention Deficit Disorder to you, and here's how it goes ...

I decide to wash the car and start toward the garage, when I notice the mail on the table. I figure I might as well go through the mail before washing the car.

I lay my keys down on the desk, sort the mail and discard the junk mail. As I discard the junk mail, I see that the garbage can is full.

I lay the bills down on the desk and pick up the trash can. Then I figure that since I'll be going near the mailbox while taking out the trash, I may as well pay these few bills first. Now where did I put my checkbook?

Ah, here it is! Oops, there's only one check left. My extra checks are in the other room.

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Manuscripts: Contributions for possible publication are most welcome. We'll do the best we can to return anything you request, but we assume no responsibility for loss or damage. Payment for submitted articles will be made after publication. Please submit both a disk and a hard copy of your article [IBM (ok) or Mac (preferred) formats], carefully checked drawings and schematics, and the clearest, best focused and lighted photos you can manage. "How to write for 73" guidelines are available on request. US citizens, please include your Social Security number with submitted manuscripts so we can submit it to you know who.

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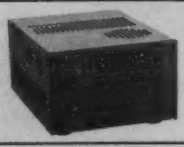
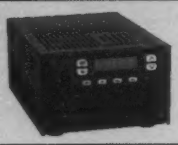


MODEL SS-10TK



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MODEL SS-18

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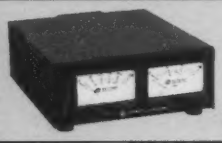
MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1¼ x 6 x 9	3.2
SS-12	10	12	1¾ x 6 x 9	3.4
SS-18	15	18	1¾ x 6 x 9	3.6
SS-25	20	25	2¾ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0



MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2¾ x 7 x 9¾	4.2
SS-30M*	25	30	3¾ x 7 x 9¾	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	7.0

MODEL SRM-30M-2

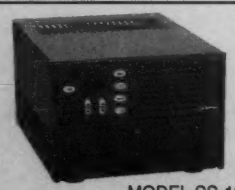
2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX



MODEL SS-10EFJ-98

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EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

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300 Channels • 10 banks • Built-in CTCSS • S Meter

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Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
Size: 2[1/2]" Wide x 1[3/4]" Deep x 6" High

Frequency Coverage:
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Our Bearcat TrunkTracker BC245XLT is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems.

Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for $159.95.

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Bearcat BCi25D APCO Project 25 digital software card	$299.95
Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$139.95
Bearcat 250D 1,000 ch. Trunktracker III handheld scanner	$339.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
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1,000 Channels • 20 banks • 50 Select Scan Channels
PASS channels: 50 per search bank + 50 for VFO search
Frequency step programmable in multiples of 50 Hz.
Size: 2[1/2]" Wide x 1[3/8]" Deep x 6[1/8]" High

Frequency Coverage:
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Begging Bowl

About once a year I get a League letter asking me to donate money. What I haven't seen in all these years of begging bowl rattling has been any productive use of the donated money. Now, is this just Wayne trashing the League again, or have I a legitimate gripe that you ought to think about?

The red flag waving for your money this time is BPL. No, not the Brass Pounder's League (RIP), it's Broadband over Power Line. Hmm, shouldn't that be BOPL?

This has to do with the public connecting to the Internet via the power lines instead of the telephone, cable or fiber optics. The benefit is a wide bandwidth being available, making possible the downloading of video and higher speed E-mail. With power lines already reaching every home and business, this is going to be a new technology that is going to be very difficult to stop. It'll have a lot of big bucks pushing it.

The fear is that the wideband RF on power lines will interfere with weak signal reception on our HF bands, right on up to six meters. That does seem likely, though the League begging letter cited no tests giving data on the extent of the potential interference.

Okay, let's say that the letter, which was sent to the entire Callbook list, not just League members, pulls in a few million bucks in donations. What does the letter say they're going to do with the money? "Everything possible," is the promise. Hey, I want something a little more tangible in the way of a plan. It looks to me as if we're talking about fighting a tsunami with a teacup.

Despite my griping, I haven't seen the slightest sign that the League has done anything visible about stopping our hobby's slow death. We need to get the word out to teens about the fun they're missing. Have you seen any orchestrated promotion efforts? Any increase in newspaper coverage of our hobby? Anything in any of the national magazines? Any move to get the Boy Scouts more involved? Anything on television? If you have, you sure haven't been letting me know about it, despite my nagging.

What I'm hearing when I tune the bands is the least QRM I've ever heard. Wide open spaces on our bands.

Yes, thirty years ago we gave the world cell phone technology ... now a huge industry with over two billion users. By the way, the League did virtually nothing to help us develop our repeater technology. Most of that promotion was done in *73* and my *Repeater Journal.*

The time was when we amateurs developed and pioneered most of the commercial communication technologies. Like FM, NFM, SSTV, and so on.

We have one more chance to make our hobby valuable to the country, and that's by getting into gear and developing QRP networks to help with Homeland Security. I didn't see this even hinted at in the League letter. They just want the money to "fight" for us. I'd like to see some hint that they have a clue as to how to fight the Internet expansion via power lines.

Being an old-timer, and my Alzheimer's not quite kicked in yet, don't I sort of recollect an ado when it was discovered that a League president had spent big gobs of the League's funds designated for protecting our bands on a Caribbean vacation for him and his wife. Refresh me on the details. Oh, there I go "trashing the League again." Tsk, I just can't seem to help myself when they're so vulnerable.

So, K1ZZ (zzz?), what plans does the League have to stop Internet progress? Come on, 'fess up. Convince me that I'll benefit by sending money to Newington.

Two Newsletters Fold

The *W5YI Report,* which has been around for over 30 years, along with the *New RTTY Journal,* folded in July. I've never seen a copy of the *Journal,* so I don't know anything about it. The *Report* covered amateur radio, computing, and new electronic gadgets. Lotta work doing the research for that wide a field.

I started my publishing career with a monthly *RTTY Journal* in 1951. It started off mimeographed and graduated to a 36-page photo offset journal with over 2,000 paid subscribers. I ended it when I signed on as *CQ's editor in January, 1955.*

By January 1960, when *CQ* got to where I was owed a year's pay, I was canned ... with the publisher's promise that I'd eventually get paid. Let's see, $15,000 at 10% per year interest for 43 years is ... around ... $903,000. Hmm, with that I could launch my magazine to revolutionize our educational system.

The folding of two more amateur radio publications is indicative of the steadily decreasing interest in the hobby. With only about 25% of the licensed hams subscribing to any ham publication ... or showing any signs of being active ... these are not our greatest times.

I'd love to help light a fire and get things growing again, but I can't do it all alone. I've asked many times for letters from you about any exciting times you've had in the hobby. I'm still waiting for your letter.

I'd like to publish some such letters in *73* and then make them available in a booklet for clubs to use to reach out to youngsters and get them interested in more than ball games and the Internet. We have a great story to tell ... but no one is telling it.

Ticket to Ride

One thing that's been concerning me is when the FCC might wake up to the fact that the amateur radio "service" is no longer satisfying most of the reasons cited in our regulations for our being allocated a few billion dollars worth of frequencies. We're no longer

pioneering new technologies. We're no longer of the slightest interest to the military as operators in time of war. International friendships? Oh, sure. Well, we're still a handy source for emergency communications.

Hey, that's our ticket!

No matter by whom the 911 event was planned, the result has been an awakening of at least some of the public to how wide open we are to terrorist attacks. It's also provided the Bush League's excuse for invading Afghanistan and Iraq (so far). But, that's an agenda I suspect will read a lot differently in the history books than we're getting from today's media.

The Homeland Security people are going to need some sort of dependable grass roots communication system when the power's down and the cells go out. One that can be called into action with no notice and work flawlessly … anywhere in the country. Hey, that should be us! And with a bunch of bazillions being thrown at security problems, maybe we should have our nets out.

Okay, what kind of service can we provide? Our gear will have to be emergency-powered, so we're talking just a few watts. Our antennas will have to be simple … maybe a long wire put up with a bow and arrow or a sling. We want to use fixed frequencies so we don't have to tune around. We'll eventually want to be able to zip messages through at high speed, including pictures, so we're not talking CW … or even voice for most throughput. So we're talking computers and special software. Well, that's next year … this year let's get started with voice.

We have a few hundred active ham clubs, each with a few dozen members. We're going to want to activate thousands of clubs, each with a hundred or so members, so that means either bringing the 500,000 licensed, but inactive, hams back to life, or getting busy recruiting some new (young) blood. Better yet, both.

We're going to need 500,000 Emergency Radio Amateur Homeland Security rigs. Will we make 'em here, or farm the job out to China or Bangladesh? At $500 each, that comes to $25 million. A pittance.

It's brainstorming time, so what do you think we'll need? Maybe each club should have an emergency coordinating van to tie the club members together. Plus it could coordinate as a hub with other communication services such as doctors, police, fire, sheriffs, FEMA, Homeland Security, military, etc. An independently powered repeater (solar?) will be important. What do you think?

Iraq

With the evaporation of Iraq's WMDs we're left with oil as the prime mover for our invasion. But I wish the Bush League had done a little post-war planning. Like maybe not throwing 400,000 Iraqis out of work when we in one day closed down the armed forces, several security groups, and the defense and information ministries. Out of work with no jobs or unemployment payments available. So much for winning the hearts and minds in Iraq.

More 9/11 Questions

There's that large flurry of short selling airline stocks just before 9/11 which has quietly faded from visibility. There's no way the people who did it could hide, so why the silence?

And how did the Administration manage to whip up that 360-page Patriot Bill in so few days? They must have had that ready to go and then fast-track zipped it through Congress. it crushed a whole bunch of our freedoms, making the conspiracy one-world crowd more believable.

Pearl Harbor stank sixty years ago and 9/11 is already smelling bad. There are too many unanswered questions … and we know the media can't be trusted to tell us the truth. It's a shame when honest reporters have to write a book like *Into The Buzzsaw* in order to get the truth the government wants covered up out in the open. The way I see it is that ABC, CBS, NBC, et al., are government and industry puppets. Ditto the *New York Times* and other major newspapers.

Infamy

Being a very, very old person, I was listening in 1941 when Roosevelt made his "Day which will live in infamy" speech. Of course there were the usual conspiracy theorists who started asking questions about who knew what when. But it wasn't until recently, when Stinnet hit us with *Day of Infamy,* that even the sports-page readers became aware of the depth of the secrecy and lying surrounding the Japanese attack of Pearl Harbor.

So I was surprised when at the Peterborough dump I found a paperback copy of *Infamy - Pearl Harbor and Its Aftermath,* by John Toland, dated 1982. Even twenty years ago he had the goods on Roosevelt. This 400-page book is well documented.

You know the part that is most discouraging about finding this book? That not one of my *73* readers ever mentioned it to me.

College News

Two items about my old alma Rensselaer Polytechnic Institute (RPI) made the news. One had to do with the sudden closing down of their School of Architecture, leaving 50 students stranded, the only college to do so. The other was a $12,000 fine for students being caught illegally downloading music. Not exactly the kind of PR they wanted.

Instant Alzheimer's

Are you still taking a medication? A letter from Betty Merritt might be almost enough to get you thinking. Well, maybe not. It had to do with her father, who had had high blood pressure. He went through five different prescribed medications. Each gave him a rash and caused him to become confused. When he stopped the rashes went away and he'd get his mind back.

Then his doctor prescribed Toprol. Her dad took half a pill before going to bed. The next morning the rash was back and he was so confused he couldn't even dial a phone. This time the memory loss was permanent.

A *Time* magazine article pointed out that blood pressure and anesthetic medications are the worst on the brain. The article said the memory might come back after as long as five years. No wonder we have so many Alzheimer's patients in nursing homes.

Cancer Cure

Acres USA had a most interesting article about George Earl-Thomas, a chap who moved here from New Zealand in the early 1900s. He was an early microbiologist. In the 1930s he began using his discoveries to treat cancer patients with the trace minerals, which even then were long gone out of our processed food … with a 60% success rate! The medical industry today only has a 7% survival rate for cancer. WWII stopped his work, but he continued after the war… until the FDA took him to court in 1948 for providing "medical advice" without a license. He fought back in court and won! But, as he was leaving the court the FDA Deputy Director who had led the fight asked him if he intended to continue to send out his literature on electrolytes and cancer. He said, "Of course." A few weeks later his lab was burned to the ground, along with all of his data and notes. George gave up.

Well, at least the FDA didn't burn his books, trash his research lab, and put him in prison, like they did Wilhelm Reich (whose orgone therapy was working miracles). Reich

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Oh! There's the soda I was drinking earlier! Hmmm, I guess I'd better take it out to the kitchen and discard it.

On the way to the kitchen, my flower arrangement catches my eye and I realize it needs more water. I pour the soda down the sink.

As I wipe a spot off the counter I see my glasses on the windowsill. It's about time. I've been looking for them all morning!

I guess I'd better go put them away so I can find them again later. But first I've got to add water to the flower arrangement ...

Hey! What's the TV remote doing in the kitchen? Aaaaaagh! I'd better take it to the living room, because we'll never think to look for it in the kitchen tonight.

I take the remote out to the coffee table and find that the living room is a bit untidy, so I go around arranging cushions and throw pillows.

Then I'm off down the hall, to... to... what the heck was I planning to do?

End of day: The car isn't washed, the bills are unpaid, the flowers aren't watered, the checkbook still only has one check, and now I can't seem to find my car keys! I don't seem to have gotten anything done today, but I just can't figure out why because I KNOW I WAS BUSY ALL DAY LONG!!!

I realize this is a serious condition and that I'd better seek help. But first, I think I'll check my e-mail.

Thanks to whoever is the author of this article on AAADD and to the folks who sent it to us through the Internet.

DXpedition, Texas-Style

When we moved to Friendswood, TX, in 1980, we looked for a home. It had to be a special location, big yard, not too close to the neighbors, and in a subdivision where the deed restrictions had already been broken for ham antennas. Luckily we found such a home, and to our joy a bunch of hams already lived in the area. We formed a club, The Forest Bend Amateur Radio Club. We were a bunch of husband/wives, all hams. We went on picnics, to conventions, and for Saturday breakfast together.

At one breakfast we got to talking about DXpeditions and how we would love to go on one. None of us had the time or money for a real one but the more we talked, the more we got to planning a mini one. Where to go? Galveston Island, on the Texas Coast, was only 40 miles away but too populated. Then someone suggested Pelican Island.

Pelican Island is a small island between Galveston and the mainland. Many years ago it was an immigration station where new arrivals were brought off ships sort of like Ellis Island in New York. Later the immigration station was closed down and a park was established. A large, three-story building was built for parties, a fishing pier went out over the Bay, and a submarine was placed for visitors. We received permission to use the island.

We called the FCC in Houston to ask permission to use the prefix /1P1 after our call. They said no problem as long as it wasn't an existing prefix. We took my "Old Man's" two-letter call, W5RK, and W5RK/1P1 was born. Our IOTA was NA143.

We were fortunate that two of our hams had RVs and were able to park them far enough apart so they would cause a minimum amount of interference between the various harmonic-related bands. We mounted a Moseley 3-element beam on one RV and on the other a vertical.

On the building which housed several operating positions, we had another 3-element beam and a number of wire dipoles running down toward the water. These were 40- and 80-meter antennas. The transceivers consisted of two Kenwood TS-930s, two TS-830s, and a TR-7.

You can imagine the bedlam when we put out our first CQ and signed de W5RK/1P1. It was almost impossible to pick out one call from the other. All in all, between us we made several thousand contacts (SSB and CW). It was an enjoyable weekend despite the fact that we operated during the entire time, day and night. Sunday evening we took everything down and headed home — feeling the joy and accomplishment, but dead tired. I designed a special QSL card. I only wish I had one left to show here, but unfortunately they were all gobbled up, right to the last card.

It was a big success, with everyone calling us and asking, "Where is Pelican Island?" Hams from all over figured some new mysterious island had suddenly sprung up. When we identified it as off the Texas coast we all got a big laugh, but everyone was tickled with our DXpedition. Even at future conventions we had hams contact us and ask about our mini-DXpedition.

Thanks to Renell Levin WB5VBP, 100 Texas Ave. W #1016, Webster TX 77598; [olevin@wt.net].

The English Language — Easy or Hard?

Eleven more reasons why the English language is so hard to learn:

1) The insurance was invalid for the invalid.

2) There was a row among the oarsmen about how to row.

3) They were too close to the door to close it.

4) The buck does funny things when the does are present.

5) A seamstress and a sewer fell down into a sewer line.

6) To help with planting, the farmer taught his sow to sow.

7) The wind was too strong to wind the sail.

8) After a number of injections my jaw got number.

9) Upon seeing the tear in the painting I shed a tear.

10) I had to subject the subject to a series of tests.

11) How can I intimate this to my most intimate friend?

Thanks to The Modulator, *April 2003.*

New Company Rules

For SICK DAYS: We will no longer accept a doctor statement as proof of sickness.; If you are able to go to the doctor, you are able to come to work.

SURGERY: Operations are now banned. As long as you are an employee here, you need all your organs. You should not consider removing anything. We hired you intact. To have something removed constitutes a breach of contract.

PERSONAL DAYS: Each employee will receive 104 personal days a year. They are called Saturday and Sunday.

VACATION DAYS: All employees will take their vacation at the same time every year. The vacation days are as follows: Jan. 1, July 4, Dec. 25.

BEREAVEMENT LEAVE: This is no excuse for missing work. There is nothing you can do for dead friends, relatives, or coworkers. Every effort should be made to have non-employees attend to the arrangements. In rare cases where employee involvement is necessary, the funeral should be scheduled in the late afternoon. We will be glad to allow you to work through your lunch hour and subsequently leave one hour early, provided your share of the work is done.

OUT FROM YOUR OWN DEATH: This will be accepted as an excuse. However, we require at least two weeks' notice, as it is your duty to train your own replacement.

RESTROOM USE: Entirely too much time is being spent in the restroom. In the future, we will follow the practice of going in alphabetical order. For instance, all employees whose names begin with A will go from 8:00 to 8:20, employees whose names begin with B will go from 8:20 to 8:40, and so on. If you're unable to go at your allotted time, it will be necessary to wait until the next day when your turn comes again. In extreme emergencies employees may swap their time with a coworker. Both employees' supervisors must approve this exchange in writing. In addition, there is now a strict 3-minute time limit in the stalls. At the end of 3 minutes, an alarm will sound, the toilet paper roll will retract, the stall door will open, and the seat will eject you.

DRESS CODE: It is advised that you come to work dressed according to your salary. If we see you wearing $350 Prada sneakers and carrying a $600 Gucci bag, we assume you are doing well financially and therefore you do not need a raise.

LUNCH BREAK: Skinny people get an hour for lunch, as they need to eat more so that they can look healthy; normal-size people get 30 minutes for lunch, to get a balanced meal to maintain the average figure; fat people get 5 minutes for lunch because that's all the time needed to drink a Slim Fast and take a diet pill.

Thank you for your loyalty to our company. We are here to provide a positive employment experience. Therefore, all questions, comments, concerns, complaints, frustrations, irritations, aggravations, insinuations, allegations, accusations, contemplations, consternations, or other input should be directed elsewhere — in triple quadruplicate.

Have a nice week.

— The Management

Thanks to the L'Anse Creuse Amateur Radio Club's Tuned Circuit, *April 2003.*

Where Record Speeds Came From

Ever wonder why the first successful disk phonograph records ran at 78 revolutions per minute? Well, a posting to one of the audiophile remailers explains it this way.

Up until the 1920s, recordings were made at a variety of speeds from 75 rpm to 84 rpm, and sometimes outside this range. The minimum acceptable speed was governed by the quality of the sound from the innermost grooves of the record. By trial and error this speed was found to be around 78 to 80 rpm.

The speed of records is based on the American electricity AC standard of 60 hertz. When engineers wanted to standardize the speed of recording equipment in the studios they started using synchronous electric motors. These are motors that are locked on to the 60 hertz power and run at precisely 3600 rpm.

If you use simple gear ratios, then 3600 divided by 46 is 78.26 rpm. And all other phonograph record speeds came from the same source as well. 3600 divided by 80 gave us the popular 45 rpm record that helped to make the rock 'n' roll revolution. 3600 divided by 108 is responsible for the LP 33-1/3 rpm record; dividing by 216 made the somewhat rare 16-2/3 rpm disks.

Of course, most vinyl albums have been replaced by digital compact disks, but the history of grooved disks is an interesting one, and now you know how it all came about.

Thanks to The Hi-Fi Remailer, via Newsline, *Bill Pasternak WA6ITF, editor.*

Do You Remember ...?

Little glass Coke-shaped bottles with colored sugar water?

Television broadcasting that stopped at midnight?

Soda pop machines that dispensed bottles?

Hamburger joints with tableside jukeboxes?

Continued on page 58

Do YOU want to be heard?

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LETTERS

From the Ham Shack

Orlo Hudson W5LVA. I am a lifetime subscriber since the '60s — the best $73 I ever spent. I have been licensed since 1941, but they had Pearl Harbor and I could not get a station license. After the shooting was over, I asked for a license and the Army issued my German call letters. I corrected this as soon as I got home. By then I had had the Operator's License for over a year and was eligible for a Class A license in my home town of San Antonio — hence the W5 call, which I still have. I got the best they had to offer at that time, and as a matter of principle — I will never "upgrade."

I got in the Army as a 17-1/2-year-old volunteer, but if I had known what I know now, they would never get me except by draft — and I would likely move to Canada in that case!

The reason that I am writing is that you have been supporting the idea that "NASA mooned us" for some time. It suddenly occurred to me that you are absolutely correct, and I can probably provide just the evidence needed to prove the case!

I would have to look at my resume to provide exact dates, and in my many boxes of records to provide numerical details, but if anyone wants to pursue it, we will be happy to do it! A summary follows:

In the early '60s, I was hired from North American Aviation by NASA in Huntsville, AL, and von Braun's "Paper Clip 100" as a Senior Staff Scientist for the Apollo Program. (I have a Ph.D. in physics.) I was put in charge of "Lunar Surface and Subsurface Probes." Essentially my job was to go out for bids to aerospace companies and to evaluate the results.

I did not care for the suggestions made by the contractors for measuring lunar gravity, so I invented the Laser Absolute Gravimeter. The patent application sat on my boss's desk for 18 months w/o action, so I wrote a memo asking that if NASA were not interested, would they give the "rights" to me. In six months, I had a NASA patent in hand and funds to build a model. The Patent Number is 3,500,688. I am the sole inventor and NASA is the owner.

I was at the Cape to see the equipment launched, and then told that I had done my job and I was reassigned to something else. After about a year I was fired for "inefficiency."

It is clear to me now that they did not want me asking questions like, "Where is my data?"

At the time I thought I was fired because the paper clip bunch did not like me: I read, write, and speak German, and they knew that I regarded them as traitors to their country of Germany.

Now I think it was simply part of the "cover-up."

Anyone who wants to look into this will get my fullest cooperation, and they are welcome to view my "201 File" under the Freedom of Information Act. Of course, that doesn't mean you will get anything they don't want you to have!

If any of this is of interest to any nongovernment investigators, then I would give them my fullest cooperation.

At the time, I thought NASA was the biggest bunch of crooks that I ever encountered.

Bob W2IK. I thought you might like to look at my two ham Web pages ... real ham radio and real ham radio pg2. I have recently moved to Texas, from Long Island. My pages will change every six weeks or so, and my WTC 9/11 series will embarrass the League, who portrayed themselves as saviors when they weren't near any action and their local officials scrambled to get into Brooklyn when it was picture-taking time. They physically pushed the real ops out of the way so they could get their pix with the League prez! The "ham of the year" wasn't even in NYC, he was at home in Babylon. What a farce! When confronted by me, the guy who spent the first 3 days at Ground Zero, they "neglected" to say anything about what nonmembers did. The Hudson Director put a small piece in his [www.hudson.arrl.org/beacon/november2001]. I have never met such a pack of self-serving people in my life. Makes me glad to now be in Texas.

It's not nice to speak ill of the dying. — Wayne.

Stuart Morrison K4BOV. Found some QSL cards I thought were lost more than 20 years ago. A gaggle of memories for sure. I had a couple of QSOs with you during my Navy days — did 20 years in the Naval Security Group. Your QSL card popped out while looking thru approximately 1200 cards I received while serving on Midway Island in the '60s. You are holding a pair of your favorite K-9's in the photo on the card. At that time, Midway was a separate country for the many awards offered to DXers. During the first year on Midway, I was the only ham and in real demand, not only by those wanting QSL cards, but also by the people on the island itself who were in constant need of phone patches. There was no other means of communication off the island unless there was a real emergency. Then, you might be eligible for a Navy E message — sort of like a telegram. Time catches us all. In the past few hours, I've already found that dozens of those QSL card owners have been lost to the ages. Some, I knew of their passing before finding the cards, as they were celebrated and world-renowned figures who have since passed thru the gates. Since many of us in Naval Communications were hams, it is understandable that we enjoyed and found interest in the various amateur radio publications of the period. Your *73* became the only periodical I looked forward to receiving. This was mainly due to the nonstuffed-shirt prattle you gave us in your editorials. Your monthly observations kept us in tune with what was going and what should be going on. I've got all the issues from the 1960 opening show.

Reminds me of when I visited VK6RU in Perth in 1966 and he pulled a 1946 card of mine out to show me. — Wayne.

Watch for these articles in future issues of *73* Magazine!

- N8TD — Vibroplex Meets eBay
- N1FN — Review of SCAF-1
- AA2JZ — Surviving the "Dry Spell"
- WA2OKZ — Using the Palm PDA
- WA2OKZ — Setting Up Your Shack
- WB9YBM — To Catch A Thief

NEVER SAY DIE

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soon mysteriously died in prison. Messing with the medical-pharmaceutical complex can be dangerous.

More Fluoride Info

Fluoride toothpaste and sodium fluoride in our water to help prevent cavities is just one more lie we've been fed. Well, it's resulting in less than 100,000 cancer deaths a year, so it's no big deal. How's it causing cancer deaths? Sodium fluoride inhibits the body's enzyme functions, knocking the immune system down. In heavier concentrations it's used as rat poison, where it causes the rats to starve to death, no matter how much they eat.

But, what about the cavities? When you start digging into the data you find that there has never been any research which has shown that sodium fluoride helps prevent cavities. Indeed, Toronto has had fluoridated water for over 36 years and they have far more cavities per person than Vancouver, which has no fluoride. The fact is that fluoridated water helps cause tooth decay. It also increases the aging process and causes birth defects in pregnant women. Deaths in fluoridated areas are 5% higher than in non-fluoridated ones.

Fluoride eats away the bones, causing them to become brittle and break more easily.

When you or your child uses fluoridated toothpaste 80% of the fluoride is absorbed sub-lingually within a minute unless it is spit out. No child should be allowed to use fluoridated toothpaste or to drink fluoridated water.

Classic Coke was tested and found to have 2.56 ppm of sodium fluoride. Diet Coke had 2.96 ppm. In fact it's found in most bottled drinks and drinks from concentrate because the country's bottling plants use fluoridated city water. Federal law does not require this to be disclosed on the label.

Cramps

My thanks to Harry Greulich WA6IWZ for a clipping on curing cramps. Take potassium.

I occasionally jump out of bed at night to stop a leg cramp. I've had foot cramps, even finger cramps. Which puzzled me, because I'm pretty healthy. Apparently eating one banana a day isn't giving me enough potassium, so I'll invest in a bottle of 550 mg potassium gluconate pills and see if they help (three a day, it says). And eat another banana.

Cutting Edge

One of my readers says he's making $15 to $20 an hour sharpening knives. He's a meat cutter in a super market, so he knows how important a really sharp knife can be for that work. Sez he knows a lady in a city who's making $100,000 a year sharpening knives. I thought you might like to know.

When I was a youngster in Brooklyn (NY) a man came around every few weeks with a horse-drawn cart sharpening knives. He eventually graduated to a truck. Every household has knives that need sharpening.

If you're interested look into Ben Dale's EdgePro sharpeners … 541-387-2222. It might be good for some spare-time cash. Ben's got a $130 model and a $340 professional model.

Anthrax Cover-Up

Less than a month after the 9/11 attack our media flooded us with the anthrax scare. Considering that both of

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If a statue in the park of a person on a horse has both front legs in the air, the person died in battle. If the horse has one front leg in the air the person died as a result of wounds received in battle. If the horse has all four legs on the ground, the person died of natural causes.

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[Danny@W4DAN.us]

Just Hang 'er Up

Clear out your closets with this fun WARC triband dipole.

Many of us have a fairly functional antenna farm. In my case, it is more like an antenna garden in relation to the size. Well, not really a garden. My XYL would surely take exception to that description! She thinks that gardens should have some sort of eye appeal. Why, sure there is eye appeal. Just looking out across the back yard beyond the tower with tribander and dipoles, you can see trees, clouds and sky. There is something for the eye of each beholder.

Regardless of the number of radiators on your "farm," there is almost always another band or two that could be added. This article may help in adding more bands — with fewer antennas and feedlines — to your aerial maze and do it simply and inexpensively.

One object stretched across the scenic view of my "garden" is a three-band sloping dipole. It is basically three dipole antennas fed with one common coax cable and designed to operate on 12, 17, and 30 meters. These three bands are sometimes referred to as the WARC bands. I picked these three bands for a design because I already had a triband yagi for 10, 15, and 20 meters and dipoles for 40, 80, and 160 meters. I didn't want three more coax cables but I did want to operate on the three WARC bands.

A triband dipole fed with a single feedline is not a new concept. I have built multiband antennas in the past. They all worked very well, but with a couple of disadvantages. Drawback number one for this type of antenna is that they have several leg ends to anchor. Drawback number two is the possibility of the wires becoming entangled. For some time I pondered the idea of building a better WARC triband dipole that did not have these two drawbacks.

During a lull in the sunspot activity and on a weekend when there were no contests and/or local hamfests, I went shopping with the XYL. We went to a local discount department store. While she looked for some necessary household items, I looked for items to enhance the back yard and "garden." I found something that I believed could be used to build a better WARC antenna. This "fabulous find" was a dozen black plastic tubular clothes hangers for ninety-nine cents. I bought two dozen. I couldn't wait to get them home and start on my new project for the "garden." See **Fig. 1**.

I wanted to use the hangers as spacers

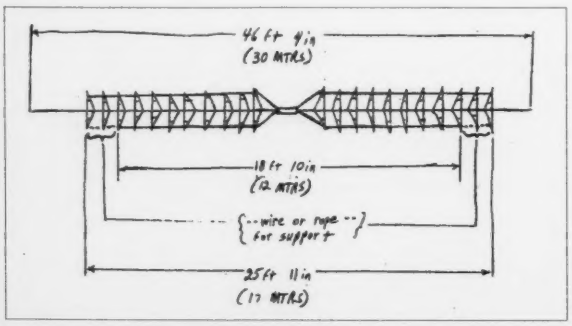

Fig. 1. This is the configuration for the tubular clothes hangers that I used as spacers.

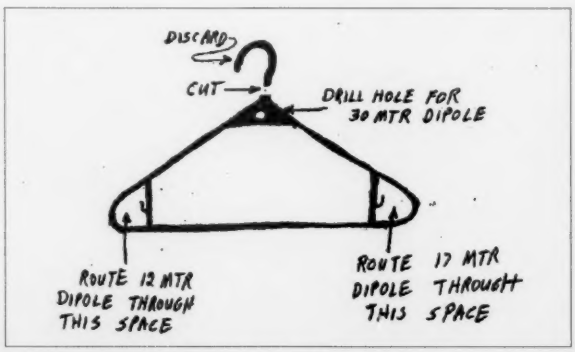

Fig. 2. Preparation details for clothes hangers.

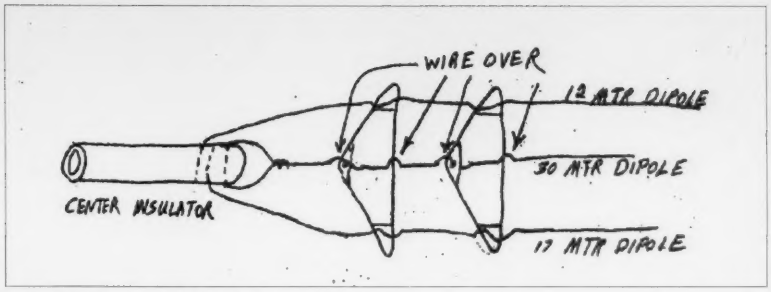

Fig. 3. Wiring detail for clothes hangers.

to separate the legs of the three-band dipole to be fed with a single coax. See **Fig. 2** for details. I drilled holes in the thin plastic tab at the apex of the hanger triangle using a drill bit that was only slightly larger than the wire to be used for the dipole legs. Next, heavy wire cutters were used to snip off the hanger hooks. They could have been left intact and possibly used in the construction. I decided to cut them off to help disguise the real identity of the hangers. So far, all observers have identified them for what they really are. Oh, well, no big deal! You may wish to leave them intact if you decide to construct this antenna. The beauty of a simple project like this is that it can be modified to suit your own needs. You may want to add more bands or build it for different frequencies.

Twenty-two of the hangers were prepared as shown in **Fig. 2**. Eleven were used on each side of the center insulator. Be sure to purchase the hangers with the reinforcement rods that run between the top and bottom at both ends. Try to find hangers of a dark color because they are not nearly as conspicuous as the white ones.

If a commercially made insulator is not available, you may want to consider making your own. A center insulator can be fabricated using a scrap of PVC pipe. Any diameter in the range of one to three inches, and cut to any length between four and seven inches, will work. Drill holes to accommodate the attachment of wires and you are in business. See **Fig. 4**.

The next task is to cut the 30-meter legs of the dipole to size. Being the longest, they will be used as the suspending elements. Almost any type of wire that is large enough to hold the weight of the completed antenna will do. Use your imagination and anything you have lying around the shop or garage. I used zip cord — the kind made to replace lamp and small appliance

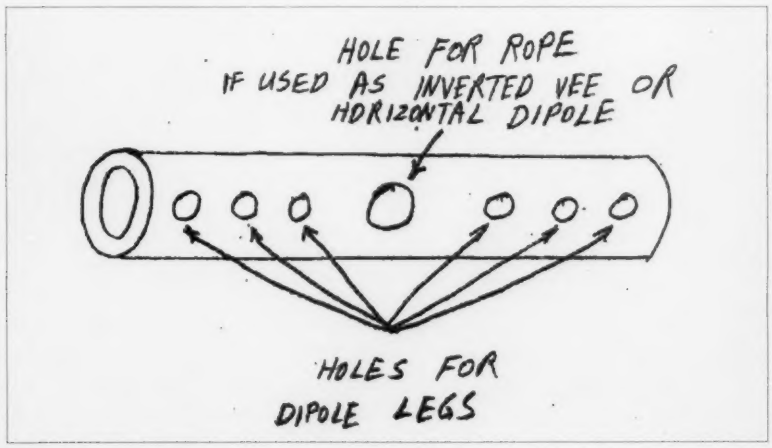

Fig. 4. Center insulator. The larger center hole is for rope, if used as an inverted vee or a horizontal dipole. The three smaller holes on each side of the center hole are for the dipole legs.

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***Photo A.** WARC dipole under construction, suspended three feet above ground.*

cords. I separated it into single conductors. It is economical and durable.

I employed the formula for cutting a halfwave 30-meter dipole and calculated that 468 divided by 10.1 MHz equals 46.33 or 46 and one-third feet. You should probably round this length up to at least 47 feet. This will make up for tying off and trimming for resonance later on.

Now, cut the 47-foot length into two pieces to make two 23-1/2 foot legs. Tie the end of one of the pieces to the center insulator. Leave enough loose on this end to trim and solder. Push the other end of the same piece through the hole you earlier drilled in the tab of one of the plastic hangers. To do this, turn the hanger down horizontally. Place the apex (where the loop was, and the tab with the drilled hole is) to your left. From left to right, push the wire down through the hole, then pull it up and over the bottom of the hanger. See **Fig. 3**.

***Photo B.** Upper half of WARC dipole with lower half blending into the landscape.*

Continue this procedure through ten more hanger/spacers. For starters, you can space approximately seven inches between them. You should have a few feet of wire extending beyond the last spacer after you have finished threading the 30-meter wire. Spacers are not required for the full length because the 17- and 12-meter dipoles will be shorter. Follow the same method to construct the opposite leg.

After completion of the 30-meter dipole, tie each end of the dipole to trees or structures to suspend it approximately three to five feet above the ground. This is a good working height. At this point the spacers may be uneven along the wire and a little tangled. Straighten them as much as possible at this time. The addition of subsequent legs will help to align them better.

The next step is to cut the halfwave dipole sections for 17 and 12 meters. The calculation for 17 meters equals 25.9 feet, with 18.48 feet for 12 meters. Cut them a little longer for trimming and tuning later. Cut these half wavelengths into two pieces each to create the quarterwave legs. Tie the 17-meter pieces to the center insulator in preparation for feeding through the hanger/spaces. Feed the wire between the reinforcement rods and ends through all 11 spacers as shown in **Fig. 3**. After feeding the wire from the center insulator and through the hangers, the end of the wire should be close to the eleventh hanger from the center insulator. Adjust the spacing on all the hangers equally and space the eleventh to accommodate tying the 17-meter leg to it. Repeat this action on the opposite leg.

The 12-meter legs should be added using the same method by running the wires between the reinforcement rods and ends at the opposite corner of the hangers. They should terminate at the ninth spacers from the center. After attaching the end, cut a piece of wire, twine, or rope to fit between hangers nine, ten, and eleven to stabilize them as shown in **Fig. 1**. Check the SWR on each band and trim as needed to obtain resonance and lowest SWR. Tuning is

Continued on page 53

Craig Kendrick Sellen
Birch Hills Residence
25 Reservoir St.
Simpson PA 18407-1300

Portable Pulse Generator

Build this pocket-size test instrument that's useful in a wide variety of lab and service tasks.

As new laboratory techniques are worked out and new circuits developed, the need for specialized test equipment rapidly changes. "Special" equipment often becomes "standard." For example, pulse generators, once found only in the larger laboratories, are gradually coming to be considered as "standard" pieces of test equipment for all labs. In some cases, pulse generators are used as much as oscilloscopes and VTVMs — "standard" equipment items of long standing.

Most pulse generators are characterized by their large physical size and their voracious appetite for electrical power. Not so, the instrument shown here. Although it delivers either positive- or negative-going pulses over a wide frequency range (100 to 6000 pulses per second), other ranges are easily obtained. With good output amplitude (12–18 volts peak across a 10,000 ohm load), the overall case size is only 3 x 4 x 5 inches and the power requirements are so small that it is practical to power it with two self-contained 9 V batteries.

In addition to its small size and low power requirements, the instrument shown has many other advantages. Highly efficient, it doesn't generate large quantities of surplus heat to increase the discomfort in a crowded lab or workshop. Light in weight and quite rugged, the instrument is ideally suited for portable and field work. It may, literally, be "slipped in an overcoat pocket."

The instrument shown also has the advantage of requiring neither "warm-up" time nor stand-by power. It is ready to use as soon as the power switch is thrown "on."

All these features have been made possible by designing the unit around the highly efficient 2N2222A. Standard, commercially available components are used throughout, and the circuit is sufficiently simple so that the average technician should have little or no difficulty in building a similar or duplicate unit in one or two days.

Circuit description

Basically, this pocket-size pulse generator consists of one transistor connected as a blocking oscillator, followed by a second transistor serving both as a clipper and as a buffer-amplifier.

Referring to the schematic diagram of **Fig. 1**, the first 2N2222A transistor is connected in a grounded emitter blocking oscillator circuit, with transformer T1 providing the necessary energy feedback to start and sustain oscillation.

A step-down turns ratio is provided to match the high collector circuit impedance to the low input impedance of the base-emitter circuit.

In operation, the "blocking" action occurs through the rapid charge of capacitor C1 through the base emitter circuit of the transistor and the secondary of transformer T1, and the gradual discharge of this capacitor through resistors R1 and R2. The blocking rate is determined essentially by the RC time constant of the circuit made up of components C1, R1, and R2.

By making R1 adjustable, the circuit time constant and hence the blocking rate can be changed. Resistor R1 thus serves as the "pulse rate" control.

Resistor R2 is provided to limit the maximum blocking frequency and to protect the transistor from overload.

A signal is obtained from the blocking oscillator stage by means of a tap on T1 and is applied, through coupling capacitor C2, to the base of the second transistor, which serves to shape and amplify it.

An SPDT toggle switch, S1, is provided to change the bias current of the second 2N2222A stage, and thus its mode of operation. When this switch is open, the stage operates with zero bias, since the base resistor R4 is returned directly to the emitter of the transistor.

Under these conditions the stage acts to limit or clip the positive-going transition and to amplify and shape the negative-going portions of the applied signal. The amplified signal appears

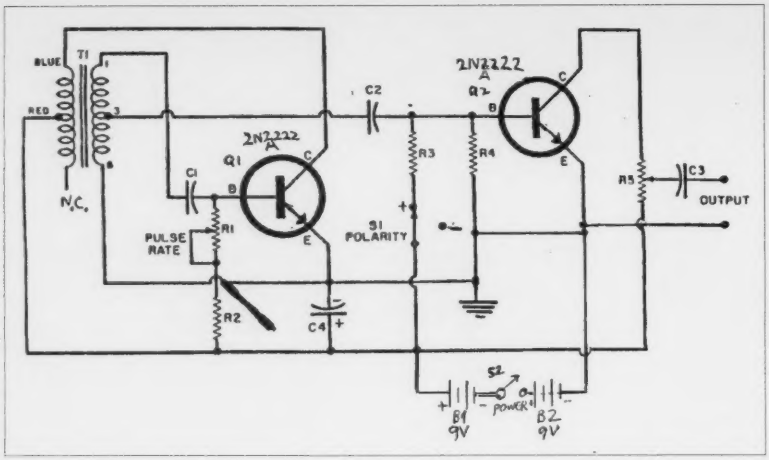

Fig. 1. Schematic.

across load resistor R5, but with positive polarity, due to the phase reversal of the stage.

By using a potentiometer for resistor R5, this resistor serves not only as the load resistor for the output clipper-amplifier but also as the output level control. The output signal is obtained through blocking capacitor C3, with its amplitude dependent on the setting of R5.

When switch S1 is thrown to its closed position, resistor R3 is connected between the base of the transistor and the negative side of the power source, thus permitting a heavy base bias current to flow. This radical shift in bias, in turn, modifies the operating characteristics of the stage so that the negative-going portions of the applied signal are clipped and the positive-going portions are shaped and amplified. This results in pulses of negative polarity appearing across load resistor R5; S1 thus serves as the pulse polarity switch.

Power is supplied by two 9 V transistor-type batteries. B1 and B2 is controlled by an SPST toggle switch, S2 serving as the power switch. Capacitor C4 is provided to ensure a low impedance across the power source.

Output signal waveforms

The waveform of the output pulses obtained from my model are given in **Fig. 2**. The signals obtained from another unit should appear similar to these, but may not be exact duplicates.

A low-frequency (approximately 200 pps, pulses-per-second) positive-going pulse is shown in **Fig. 2A** and a high frequency (about 6000 PPS) positive-going pulse in **Fig. 2B**. As can be readily observed by comparing these two illustrations, the pulsewidth remains relatively constant. It appears narrower in **Fig. 2A** because of the lower repetition rate. The pulsewidth depends primarily on the characteristics of transformer T1 in the blocking oscillator stage.

When the polarity switch S1 is thrown so that negative-going output pulses are obtained, the shaping action of the output 2N2222A stage is not quite as good, so that the negative-going pulses are not quite as sharp as the positive-going pulses. Nonetheless, they are quite satisfactory for most practical work.

Typical high-frequency negative-going pulses (about 6000 pps) are illustrated in **Fig. 2C**.

The maximum amplitude of the output pulse is approximately equal to the voltage of the power supply battery B1 and B2, because the output 2N2222A stage is driven over such extremely wide limits. On one peak the collector current is reduced to virtually zero, while on the other peak the collector current reaches the maximum possible with the supply voltage and the load resistor (R5) used.

Construction hints

The exterior and interior of this model are sufficient to indicate the general layout and parts placement. This layout need not be followed exactly, although standard good wiring practice should be used.

Although the model was assembled in a standard 3 x 4 x 5 inch metal box, either a larger or smaller case may be used. If a smaller case is employed, the wiring will require somewhat greater care. Even a plastic case can be used.

All controls and switches in the model were labeled using commercially available black decals protected after application by three coats of clear plastic. The plastic coating is easily applied with a standard spray can.

The battery is held in place by a small "Z" bracket, with its connections made simply by soldering leads to its

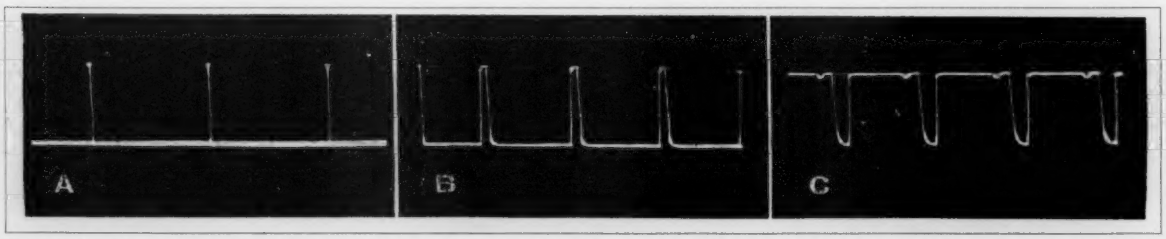

Fig. 2. Waveform of output pulses obtained from the author's model. (A) Low-frequency (200 pps) positive-going pulse. (B) High-frequency (6000 pps) positive-going pulse, and (C) high-frequency, negative-going pulse (6000 pps).

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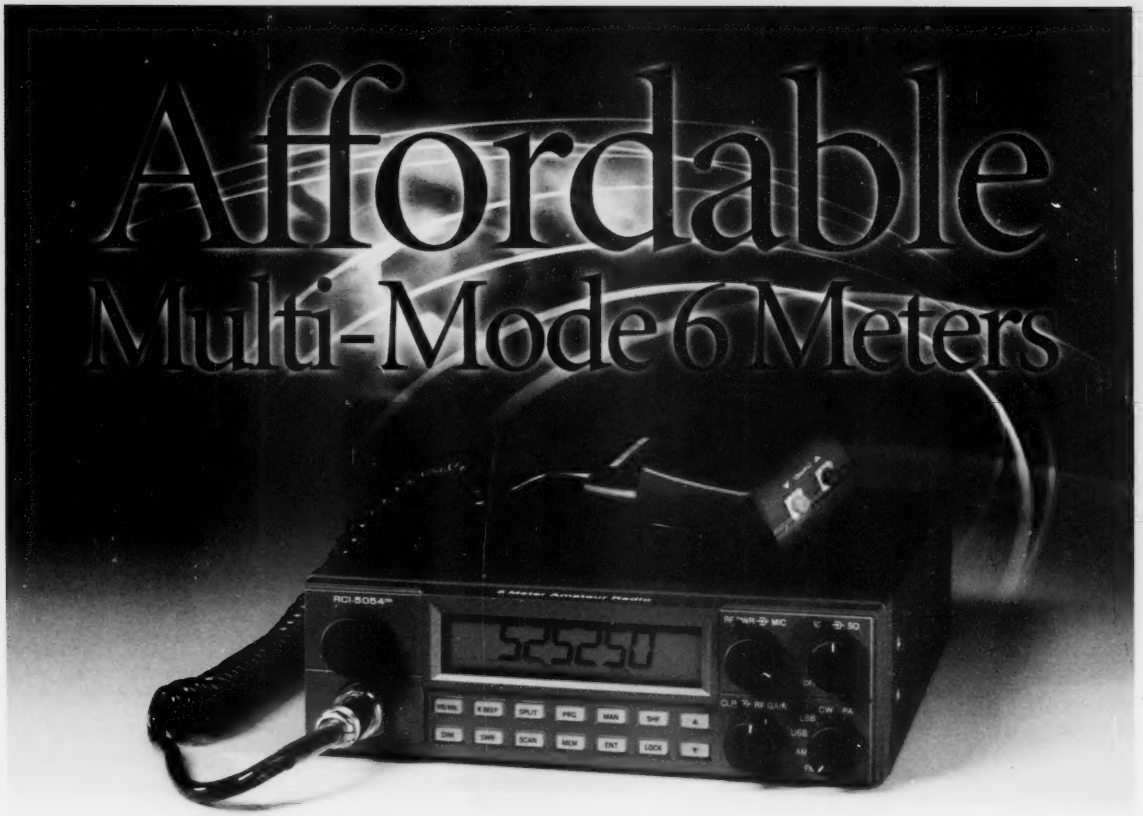

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Part	Description
R1	2 meg carbon potentiometer ("pulse rate control")
R2	27k 1/2 W
R3	6.8k 1/2 W, see text
R4	18k 1/2 W
R5	10k carbon potentiometer ("output control")
C1	0.1 μF disc
C2	0.05 μF disc
C3	0.5 μF disc
C4	100 μF 25 WVDC electrolytic
S1	SPDT toggle switch ("polarity control")
S2	SPST toggle switch ("power control")
B1, B2	Two 9 V batteries in series
T1	Universal audio output transformer (Stancor #A-3856 or equiv., see text)
Q1, Q2	2N2222A

Table 1. *Parts list.*

tin end terminals; or you may want to use battery clips. A certain amount of care must be exercised when doing this to avoid overheating and shortening the life of the battery.

Scotch electrical tape was used to insulate the exposed battery terminals after the connecting leads were soldered in place.

Another builder might prefer to devise and construct a small clip or socket for the battery, so that it would not be necessary to use a soldering iron to remove or replace the unit.

I installed the transistors in the model by simply soldering them in place. Should the prospective builder decide to follow a similar course, exercise special care to avoid accidentally overheating and damaging these components.

Transistors are especially sensitive to heat damage. Where they are to be soldered in place, the leads should not be cut too short and the actual soldering should be done as quickly as possible using a well-tinned and quite hot iron. An alternative is to provide sockets for the transistors.

The primary connections of transformer T1 are identified by color-coded leads when the secondary connections are identified by numbered terminals. The proper connections for the STANCOR transformer that I used are indicated in **Fig. 1.**

Parts substitutions

A number of parts substitutions are permissible in order to change the operating characteristics of the pulse generator. However, in addition to these component changes, a number of other parts may be changed without modifying the basic circuit.

As mentioned earlier, either a larger or a slightly smaller case may be used without difficulty. In some instances, a builder may wish to wire the pulse generator into an existing piece of equipment.

Slide or rotary switches may be substituted for the toggle switches used as the polarity and power switches in my model. If preferred, a volume control–type switch could be used for the "power" switch, permitting this unit to be combined with either the pulse rate or output controls.

Although binding post output connectors were employed, tip jacks, banana jacks, or even a coaxial or a BNC connector may be used instead.

An Everready type 411 battery may be used in place of the battery specified in the parts list. This unit is about the same size physically and supplies the same voltage as the battery I used.

Capacitor C4 is not critical, since it is used only for bypass purposes, and a smaller or larger unit may be substituted here without difficulty.

The size of the output blocking capacitor C3 is noncritical, and either a larger or smaller capacity may be used here if desired. The larger capacities are suggested to prevent possible distortion of the output signal waveform.

Circuit modifications

The basic pulse generator may be easily modified to suit the specialized needs or requirements of the individual builder. Let us discuss the more important modifications in order:

Changing pulsewidth. As mentioned earlier, the pulsewidth depends primarily on the characteristics of the transformer used in the blocking oscillator circuit. I used a standard "universal" audio output transformer. Where the prospective builder has access to special transformers, it should be practical to substitute another unit to obtain either a narrower or a wider pulse.

Changing the pulse rate range. My model covers a range from approximately 100 to 6000 pps. Where a different range is desired, it is necessary only to change the value of C1.

Using a larger capacity here will reduce the operating frequency, while a smaller capacity will increase the frequency. If desired, several ranges might easily be provided by using a selector switch to choose different values of C1.

The pulse rate range covered by the pulse rate control may be extended to provide wider coverage or reduced to provide more accurate adjustment. To extend the range covered by the control, use a potentiometer having a larger maximum resistance — a 5 megohm or 10 megohm pot, for example. To reduce the range covered by the control, use a pot of lower maximum

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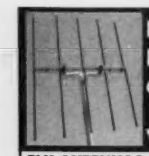
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resistance (1 megohm, 500,000, or even a 100,000 ohm unit). Where pulses at only a few fixed repetition rates are desired, a selector switch may be substituted for the "pulse rate" potentiometer, and fixed resistance values chosen as the switch is rotated.

Changing the output impedance. Where a lower or slightly higher output impedance is desired, it is only necessary to substitute a potentiometer of the desired impedance (resistance) for R5. When this is done, care should be taken that the output transistor cannot be accidentally overloaded. Do not use a pot of less than 3000 ohms with an 18 volt supply.

Obtaining pulse of fixed amplitude. Where the user will not need an adjustable output amplitude, a fixed resistor may well be substituted for R5. The output pulse amplitude should approximate the battery supply voltage and should remain fairly constant, even at different repetition rates. A fixed amplitude signal with a lower value may be obtained by using two fixed resistors in series in place of R5 to form a simple voltage divider. The output signal is obtained at the junction of the two resistors.

Obtaining pulses of fixed polarity. Should the user not require both positive- and negative-going pulses, the pulse polarity switch may well be omitted and the circuit permanently wired to deliver whichever type of signal the user requires.

Conclusion

The possible applications of a pulse generator are too numerous to more than briefly indicate. New applications are constantly being worked out, and the individual worker often finds that the only limitation on his use of the instrument is his or her ingenuity and skill in applying it.

The pulse generator is particularly valuable for operating many types of "slave" sweep circuits or for synching recurrent sweeps and multivibrators. A simple linear sweep (sawtooth signal) generator may be formed by using the positive-going pulse from a pulse generator to operate a discharge transistor connected across the capacitor in a simple RC series network. The capacitor is charged slowly through the resistor from a DC source, and then discharged rapidly by the transistor when a positive pulse is applied to its base.

Pulse generators are widely used for checking and testing delay lines, for checking the transient response of amplifiers, for testing counter circuits, and for calibrating and testing radiation instruments.

The pulse signals obtained from a pulse generator are also useful for oscilloscope retrace blanking and for use as a marker to divide a scope trace into segments of known duration. In both of these applications the pulse signal is applied to the "Z-axis" or intensity modulation terminal of the scope.

Considering the small amount of time and money required to build this compact unit, it makes a worthwhile project. 73

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Tired of getting your winter Vitamin C from some little pill? I have found my trips through the Caribbean to be a much more FUN way to do it, allowing for a bit of common sense like wearing the proper clothing and — of course — sunscreen.

For the fall trip, since I mow about 4 acres all summer, that is as simple as a hat to cover the thinning fur on top, and about SPF 15 or so sunscreen. For the usual trip around April, so I can include the fun of Carnival, I have actually considered something on the order of SAE90 Valvoline for sunscreen. If this article warns of nothing else — the sun it HOT down there — so don't even compare it to trips made to Florida or Texas!

The latest trip was 11/21 to 12/3 of 2002 , so I am not long back, and minus 71 degrees of heat from there to here. The "there" this time refers to St. Thomas, USVI.

Forgive me if I bore some of you with basic details, but I am always amazed at how many people here on the mainland USA have either never heard of it, or worse, place it somewhere in the sunny Pacific. It gets only slightly better when I tell them it is about 70 miles east, airport to airport, from San Juan, Puerto Rico.

The questions then lead to things like, "Who owns it?" (We, the USA, "own" it — sort of — it is a U.S. territory just like Guam — which *is* in the Pacific.) Or, "What language do they speak?" (English, just like us — if you can call our Americanese English. I know several Brits who would disagree — hi!) And of course there is always the thing all travel boils down to: "What is their currency?" (Good ol' Yankee dollar — 1 for 1.)

And that holds true for all three of the major USVI:

Photo A. *Northeast view from the ham shack. St. John, USVI, to the right, about 6 miles away; Tortola, BVI, straight ahead, about 13 miles out.*

Photo B. *Charlotte Amalie harbor in St. Thomas, with cruise ships at the Havensight Mall docks.*

Photo C. *Sunset from a nice dinner place right below where the usual ham shack in the past has been high on the eastmost mountain.*

Photo D. *The super-portable ham "shack" used on the November 2002 trip.*

• St. Thomas — where I generally go because of business and the many friends made there since the first 1984 visit.

• St. Croix — larger in size, but much more the industrial base versus St. Thomas's tourism.

• And last, the much smaller, quieter, St. John — where over half of the island is National Park, offering excellent camping options. I know there is no electric (or "gennys" allowed — noise!) on the "bare" sites where you bring your own "everything." I would think that you could operate (quietly — think of your neighbors and why THEY are there) from any of the other sites that do have electric. Best you check first, same as anywhere, but it is the same National Park Service as up here, so it should be quite easy to find on the Internet.

Before moving on, there are also three beautiful islands right to the east of St. John that are the British Virgin Islands (or, as more commonly called, "the BVI"), which ALSO take US dollars. And they don't just accept them — the dollar IS their currency. And they're not hard at all to visit — all you need is simply a valid ID like driver's license with picture, notarized/certified copy of birth certificate, or — get this — even a voter registration card!

It was the planning of this fall trip to include for the first time, the BVI, and a previous two-week visit earlier this year in April to Trinidad, that prompted me to ask Wayne about writing up an article about the "mini-DX" trips he often has been on and related himself. There were some things that the ARRL site were just not keeping up on. That is not their fault entirely, as it would certainly take a full-time employee polling just the Caribbean islands once a week to be always "current," and that is just not practical.

I offer that information more so that you will not be shy about using things like the Internet, or consulates here in the USA of "foreign" places you think would be fun to visit, and even more fun to operate from. I can tell you for a fact that since the first ham operations were done by us there in St. Thomas, about 1994, it has been so much fun to be at the BOTTOM, and the source or reason for a 100-kHz-wide (and more) pileup — instead of sitting frustrated on the other end trying to work the DX.

This will also quickly teach you how ridiculous and inconsiderate stations trying to work the DX can be. Sadly, it is stateside stations with ?kW who are the worst offenders. I mean really, guys, St. Thomas is fun, and mini-DX to be sure, but it is NOT some ROCK in the South China Sea with about a one-in-a-1,000 chance of becoming the latest DXCC country number. (Have they fudged enough places as "countries" to reach 400 yet? And more so — who cares?)

I would offer my limited twice-a-year-or-more opinions on what works best for us under those conditions, right along with apologies to those patient souls who hold back and TRY to remain sane while working us. As the saying goes, "When the going gets tough, ..." And we TELL everyone right on the air.

When it becomes less than gentlemanly, less than fun (a HOBBY), and people (fortunately few) get snotty, there is the beach — the local rum — the local food — the not-so-local "eye candy" from the cruise ships mostly (and if Wayne follows what that is, then so will most hams, as we ALL are not getting any younger — hi). So we simply pull the plug! Sometimes it is just for an hour, and we go for a quick swim nearby (the whole island is only 13 by 4 miles), and we are on a mountaintop right at the east end and less than a mile to FIVE of the prettiest beaches — duh. Other times, it becomes, "Let's go shop, or scuba, or snorkel, or ...." You get the idea.

I considered, if only briefly, giving you a chapter and verse on all the ins, outs, and equipment that I/we carry, but it can actually be fun PLANNING and getting ready for the trip on your own. For that reason, I would highly recommend that your first visit to the Caribbean be to St. Thomas. The obvious no-brainers like citizenship, currency, language, and such definitely apply. Also, because you are not aware of it, I will tell you that they have at

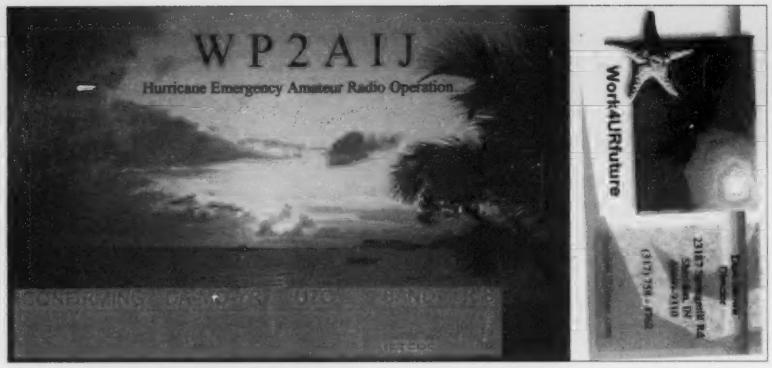

***Photo E.** HEARO/WP2AIJ QSL with detachable business card.*

least two Radio Shack stores (you are not out camping in the bush!), and grocery stores where you will recognize at least 70% of the foods offered (and I recommend that you TRY the rest). I can guarantee that you will be well taken care of if you book through us (for a place to stay — for travel you are on your own, except that we would offer suggestions of whatever we know on that).

On the ham radio part: One of the places we stay at and is rented to other hams year-round has a permanent antenna setup — 30-ft. pole with Cushcraft R5 atop — that has a FULL 360-degree view out over salt water. You have not operated until you see what salt water ground anywhere near you can do for you.

On the other hand, actual station grounding was not simple as you are on a volcanic rock. St. Thomas harbor at downtown Charlotte Amalie (largest town) IS the crater of a dormant volcano. There is still a rather hefty (35A, I think) boat anchor ASTRON supply there in the ham shack (yep, they built us a room no less), but I firmly believe in you taking your own radio and power supply, and that the power supply be a line-protected switcher.

To give you a starting point, I have run a DX70T Alinco and the ASTRON SS-20 and covered many a mile of the Caribbean island-to-island in a converted and foam-lined camcorder case (which DOES meet all carry-on requirements regarding weight and size). I still have room in there for the actual PTT mic (not often used, but nice backup), logbooks, etc., and even a small digital recorder to save my voice on solo trips.

The ham shack room came about when friends from the Thomson Amateur Radio Club went down with me in 1994 and we operated from a terrific beach house on Cabrita Point (far east end — but NO elevation!). It was nice and close to the beach, however (see handling pileups — above), and the beach/trees/salt water made for good support for the wire coaxial dipoles we carried that trip.

A lot of talking and planning after the return from that first adventure led to us forming a club for down there, with the expressed reasoning of emergency communications location — but supported by year-round use by amateurs like us. Thus, the HEARO club was born (H>urricane E>mergency A>mateur R>adio O>peration) and WP2AIJ (Whiskey Papa 2 America's Island Jewel) took to the amateur airwaves. It has been a FUN time by all ever since.

My trip this time was solo — I no longer "work-fo'-de-man" and set my own hours (and days — hi), and I was trying out yet another site only a bit down the mountain on the northeast side. The HEARO ops down there are ALWAYS done QRP — 10 watts or less any mode — but not because we are all, or even any of us, diehard into QRP.

Think about emergencies for a minute, like hurricanes. Add to that the isolation of an island. One GOOD thing about that is the large number of easy-to-obtain deep-cycle marine batteries! Running 10W, we figure we are good for DAYS on just one battery — maybe weeks, with a bit of caution and time watching. So our fun is also the POP (proof of performance) to hand to FEMA, Red Cross, CD, or anyone who wants our help or location.

To put the naysayers to rest — we have QSL CONFIRMATIONS from ALL the "real" countries! We are not down there to just DX — or contest (though that is allowed, of course) — or to talk to some rock passing for #400. The greatest fun so far has been to populate the 12m and 17m WARC bands from down there at least twice a year.

There was a time when two things kept KP2 land from being heard on WARC: A lot of hams (like the rest of us up here lately) were older, retired, moved business there for warmth just like FL and so on, and many had rigs

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***Photo F.** Back of HEARO QSL.*

that just plain did not have the WARC bands. The few that did got buried every time they came on the WARC bands, with all clamoring for QSLs — and that can be costly these days. We simply filled that void and had a ball doing it.

On the subject of QSL cards — and the few loyal souls who still really DO it and not just pass out the hot air of, "Yep, QSL 100%" — may I offer our observations there as well? Let your conscience be your guide. We (HEARO/WP2AIJ/the club) DO QSL 100%, and sadly, with postage going up and up, this has become quite a realistic burden. We kept cutting costs over the years by going to laser-printed cards done from one "master" file, but in many club members' homes. We took the postage burden on ourselves — which is NO fun when you pass the 1,000 mark and figure you just paid for someone's airfare! Our answer to this so far has been that we will NOT ask for "green stamps."

Somehow, that grates on all of us the wrong way and leads to PAID expeditions whose receivers only seem to "hear" the color green. If the ARRL ever gets their electronic eQSL program actually going instead of talking about it (bureaucracy moves slowly), or would just simply "adopt" the whole perfectly-working-and-secure-that-I-can-see [www.eqsl.net] operations, then the whole problem would be solved.

As it is, I am trustee for the station and also official QSL manager (with lots of help from the guys), and so I set the digital recorder program half that gives QSL info to read "as follows" — and it works. Come into this century with us and quit worrying about bureaucrats at ARRL accepting eQSL — and you get an IMMEDIATE eQSL on my return (I was back 12/3, and on 12/4 they ALL went out).

Next, for all stateside stations that "should" understand the cost problem of postage, we merely ask that you send YOUR real QSL and preferably a business-size SASE, because we do a standard-size QSL with a "tail" that is also a business card you can slice off. For the foreign stations, we leave it to them. By bureau is fine — we can usually have all those done and bundled and sent inside 30 days (so you may only wait a year to get it). OR, you can QSL direct like stateside, with your card and "postage."

As that was 34 cents that last round and now 37 cents and climbing, — we finally gave in to THEIR request to just send one even green stamp US, and apply any difference to our HEARO ops — VERY nice of them! I think you will find that group the easiest to deal with on ALL subjects while down-islanding. Hi hi.

I want to keep this effort rather short, to the point, and yet general in nature, so if you are even thinking of a down-island battery recharge time for your body and soul — feel free to contact me through the Web site (sorry — I'll start giving out my "real" E-mail address when all the SPAM is back in the can — WITH the spammers) [http://www.work4urfuture.biz].

I have learned a lot about moving up a notch and visiting other islands where you can NOT just use your license as on the USVI. One is the Trinidad trip I just finished in the spring, and the realities of how to make that a real ham radio adventure (versus what I gleaned from the ARRL travel site and those listing information on it, which were two totally different things). It is just too easy, with my help I guess, to get direct answers from all the right people right ON the island you intend to visit — it is called the Internet! 73 and happy mini-DXing — it is a BALL.

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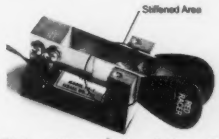

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73 Repaired My TV

Thanks, guys!

Being a ham, I read 73 Magazine *and was very interested in the articles on digital TV/VCR tuners written by Hugh Wells[1] in the issues from September 2000 through March 2001. From those articles, I learned enough about digital tuners to give me the confidence to work with them.*

These TV tuners looked useful for ham test gear, including monitoring local ham repeaters, and were selling for $5 to $10 at local swapmeets. The hardware to exercise the tuners, described in *73* articles, looked easy to construct. Before starting my project of building a ham test generator, there arose an emergency need to repair my TV set, which appeared to have a bad digital tuner. This offered me an opportunity to work and gain experience with digital tuners and further prepared me to work on my ham test generator project. Here is my story …

TV failure — Troubleshooting symptoms

My own 15-inch Sharp color TV suddenly developed problems. See **Photo A**. All UHF channels and only VHF channels 7 and 13 looked OK. Channels 2, 4, 5, 9, and 11 *always* failed after running for 5 to 10 minutes. After they failed, I observed no picture — only snow with no sound.

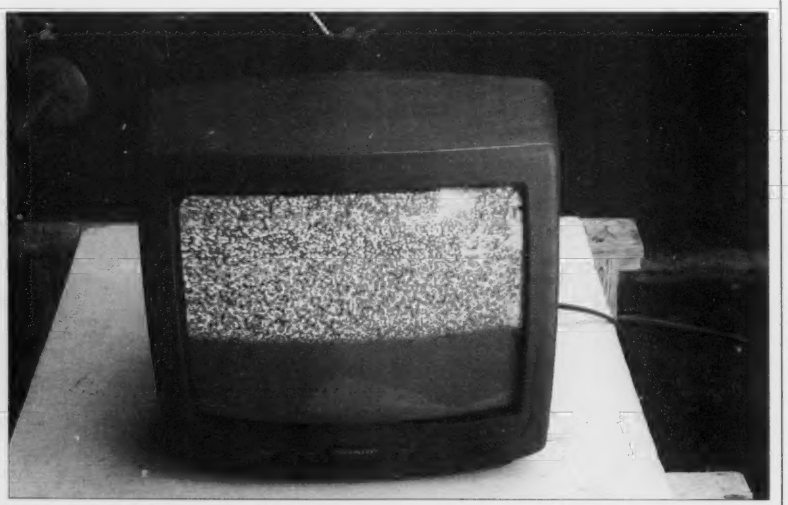

Photo A. *My failing Sharp TV.*

Like any ham troubleshooting a ham receiver gone bad, I studied my TV's failure symptoms, which were as follows:

1. Color, sound, and sync were perfect on some VHF and *all* UHF channels.

2. At the same time, while some VHF channels were OK, other VHF channels were pure snow without sound.

Displaying a good sync'd picture and sound could only happen because video/sound IF, HV, sync/separator, yoke, and flyback circuits were working OK. Since the tuner obeyed the TV's remote control by actually displaying the correct channel, I concluded that the tuner's digital chips were obeying digital commands from the TV microprocessor. Failures in those TV and tuner circuits were ruled out. Snow instead of picture with no sound only on some channels suggested that on failing channels, the tuner was off frequency or lost all received signal. I suspected failure of the tuner's RF/mixer/oscillator circuits.

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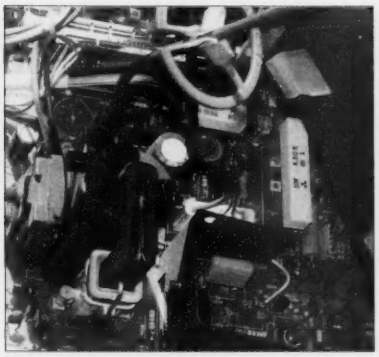

Photo B. *The bad tuner on the TV motherboard.*

After studying the digital tuner articles in *73*, and the TV symptoms, I believed I could purchase suitable digital tuners at a swapmeet. Part of the adventure of this repair was to replace my bad tuner with a tuner that was *not* an exact replacement tuner. Instead, the goal was to use whatever similar tuner I could find at the swapmeet but not necessarily one that was meant for this specific model Sharp TV. Information from the *73* digital tuner articles suggested that *exact* replacement tuners were not needed. Only digital tuners using the same digital chip set were required for compatibility. The digital chip in the tuner that must understand commands from the TV microprocessor was the phase locked loop [PLL] and synthesizer [SYN] chip, not the mixer/osc or channel 3 and 4 modulator chips.

Actually repairing the TV

I removed the rear cover to locate the digital tuner, and found that the tuner was mounted on the motherboard [MB]. See **Photo B**. I found that parts on the MB adjacent to the tuner were almost touching the tuner's metal sides. Fitting the replacement tuner onto the MB would be a tight fit.

Since troubleshooting convinced me that the tuner was really bad, I questioned how to approach this repair. A local tuner rebuilder quoted $65 for an *exactly* rebuilt replacement. For my budget, $65 was too much money, especially since there was a remote chance that the tuner was not really causing the failures. I assumed that any swapmeet tuner, if not usable in my TV, was still usable for my ham projects.

If I removed the tuner, could I actually repair it myself? Without tuner documentation, the only repair possible by me was to resolder parts inside the tuner. An Internet newsgroup[2] indicated that some varactor digital TV tuners did actually have troubles traceable to poor solder and were repairable by CAREFULLY resoldering. But, resoldering tuners with SURFACE MOUNT DEVICES [SMD] is delicate work and carries risk of creating damage rather than repairing faults. A high skill level and some special equipment is required to ensure a repair without damage.

Opening tuner

To remove both metal covers, it was necessary to unsolder the tuner from the MB pads and dismount the tuner from the MB, which I did. See **Photo C**. I removed all metal covers so that I could see both sides of the printed circuit boards with chips and components. All ICs, diodes, Rs, and Cs were in SMD packages.

It became apparent that resoldering by me was too risky and beyond my skills. A far less risky approach was to replace the tuner, which I decided to do. In my failing tuner, I found two SMD chips: MC44817D was the PLL/SYN chip, and Sharp XT648N was the mixer/OSC.

Replacing the tuner

Now that resoldering to repair was not advisable, and a rebuilt tuner was too costly, it was time for me to find another compatible replacement tuner.

From Mr. Wells' *73* articles, I had a good idea of the signal and

Continued on page 24

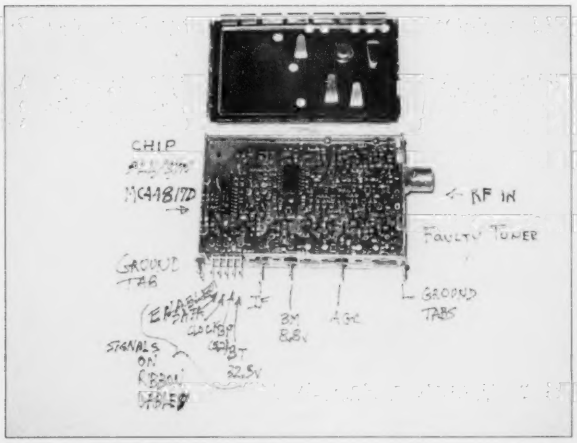

Photo C. *All parts in the bad tuner are surface mount devices (SMD). I've marked this photo to show signals/voltages on three large pins and 5-pin header.*

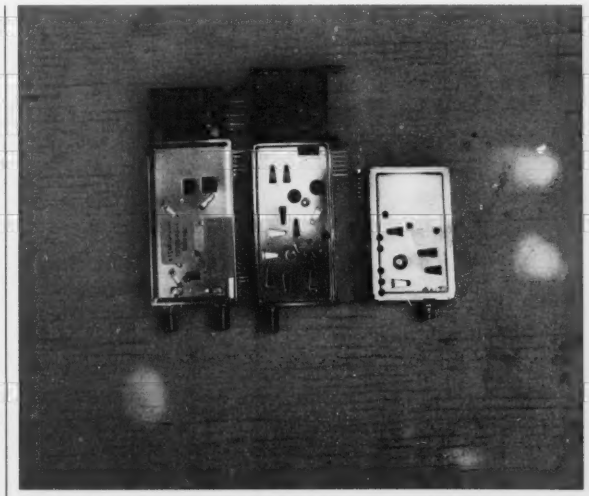

Photo D. *A few shapes and sizes of swap meet digital tuners.*

continued from page 23

power requirements for ANY digital tuner that would be compatible with my existing tuner.

A compatible tuner

What are the requirements for a compatible tuner? First, the replacement tuner must use the same SYN/PLL IC as my present bad tuner. My bad tuner used a MC44817D. Next, the replacement tuner must use the same analog and digital signals and voltages as my tuner.

I looked at the component and signal names marked on the bottom of the MB, at the tuner location, and found my tuner had 10 pins carrying signals, power, and ground which connected to pads on the MB. A replacement tuner, if it must drop into the existing MB tuner area and pads, would need to have four mounting feet, three large diameter pins, and five signal pins on a small header, **Photo C**.

On **Photo C,** see:

1. AGC, RF input (RCA) and IF output signals.
2. BM, BP, and varactor BT voltages.
3. Four low inductance ground pins.
4. Digital signals: Clock Enable and Data.

However, I still needed to know exact BM, BP, BT voltages for my MB/tuner.

The easiest way to settle power supply voltage questions was to measure those voltages when the TV was operating, which I did measure. I found that BP = 5.2 volts, BM = 8.8 volts, and BT = 32.5 volts.

I now had a good idea of what signals and power supply voltages would be needed by a replacement tuner.

Finding a replacement

I went to the local ham swapmeet, bringing my failing tuner to help match it to another one. At the swapmeet, I found that digital tuners were being sold. See **Photo D**. Some tuners were attached to their MB and other tuners were disconnected and in bags. Some tuners in bags had signal and power supply info, some had no info. Had to look through piles of MBs and bagged tuners, and I had to remove metal covers to determine if an MC77814D IC was used.

As I looked through many swapmeet tuners on MBs, I found several tuners that were very close to the REQUIRED size, signals, and voltages. This was very encouraging, because I could see that their ground, AGC, IF, and BM pins could mount in my MB pad pattern. Looking more carefully showed that while package sizes were very close, the 5-pin header pattern was different from tuner to tuner, and none were found that fit my MB pad pattern. The header contained three digital signals and two voltages.

I did not find any tuner that exactly matched all the body pins and header. Tuners I bought had offset header pins but otherwise looked like they would mount in the MB.

I bought three tuners at $5 each for my TV repair and some for the upcoming ham projects. All tuners I bought used proper PLL, ensuring that they could be used in my TV. Having no experience with swapmeet tuners, I bought three to be sure I would get one good one.

A preliminary tuner test

Using one of my swapmeet tuners, I did a preliminary test. I wired one tuner into the MB with a 6-inch-long cable. This cable length created a much longer path for digital signals than when the tuner is soldered directly into the MB. For this test, I did create a low inductance ground connection from tuner to MB consisting of a 6-inch-long 3/8-inch-wide tinned copper braid. See **Photo E**.

First power test

After applying power to the TV and new swapmeet tuner, a good picture and clear sound resulted. As a test, I selected VHF channel 2, a channel that had previously failed, and then tuned to UHF channel 28. Selected channels were perfect. The replacement tuner responded correctly to the remote control commands, and the TV was working correctly. All channels that had previously failed in 10 minutes stayed running for hours with no sign of old faults. I concluded that the original tuner *was really bad.*

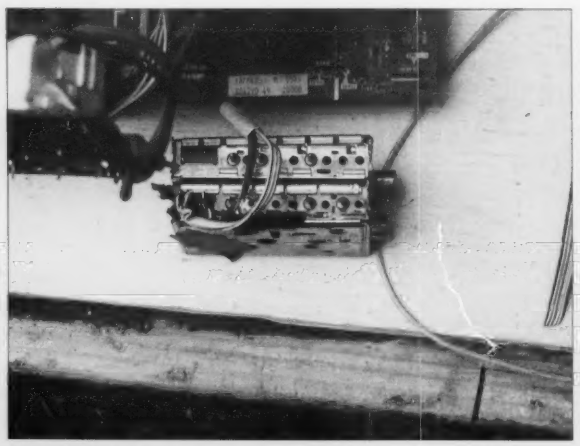

Photo E. *First power-on tuner test with test cable attached.*

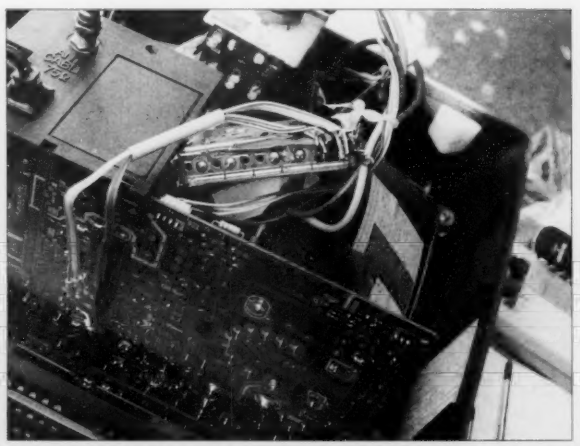

Photo F. *Final ribbon cable routing along bottom of motherboard.*

This proves the concept that a digital tuner not intended for a Sharp TV could be a usable replacement, performing all original functions, IF THE CORRECT PLL/SYN CHIP SET WAS MATCHED and other signal/power supply needs were met.

This test result was very encouraging, and now it was time to permanently install the swapmeet tuner.

Mounting the tuner in the motherboard

I now attempted to mount the replacement tuner (same size as faulty tuner), onto the MB. The metal ground tabs were too wide and required filing to narrow. Narrowed tabs did allow the tuner to be inserted into the MB pads.

Tuner ground pins in the MB pads created an excellent low inductance ground. After filing tabs, the three large pins carrying AGC, BM, and IF signals also inserted into the MB pads. However, the five signals on the small header would not insert into the MB pads due to different pad layout.

I soldered a 2-inch-long 5-wire ribbon cable directly to the tuner's small header pins and inserted wires into the top side MB pads. The tuner sat on top of the folded ribbon cable on top of the MB. This cable, when folded over, raised the tuner so high off the MB that the AGC, BM, and IF tuner pins would insert into the MB but not pass through the bottom pads, making it impossible to solder the tuner pins. This was not a workable arrangement. A new cable scheme was needed.

New cable scheme — see Photo F

I created a 6-inch ribbon cable attached to the tuner's 5-pin header, routing this longer cable from tuner header along top side of the MB to the rear edge 3 inches away. Then I routed remaining cable back another 3 inches on the MB bottom side back to the tuner's header pads. Since two grounds and three large pins mounted directly into the motherboard, the ground system was ideal. However, the tuner was not designed to have a 6-inch cable between digital signal sources and the tuner signal inputs. Would the tuner operate with a 6-inch cable to the MB?

When power was applied again, the TV functioned correctly. All functions commanded by remote control unit worked as expected. The tuner swap was a success, the TV seemed to operate OK, and sensitivity was identical to that of the previous tuner. I have no idea what brand TV this tuner was designed for, but it is operating just fine in my Sharp TV.

What did I learn from this project?

I learned the following:

1. In a TV that has a faulty digital tuner, it IS possible to use a low-cost replacement digital tuner that is NOT an exact replacement, if the replacement uses the same signals, voltages, and chip set.

2. Finding an exact size match and pad pattern is unlikely, but not a show stopper.

3. If the tuner must be placed at a location other than the original location on the MB, then a cable will be needed for bringing analog, voltage, and digital signals back to the MB. A good low-Z ground is needed between tuner and motherboard. Keep these cables short.

4. Choosing the location for a replacement tuner inside a crowded TV may not be easy. Choose a location to avoid bringing cable near strong fields. I would avoid mounting the tuner near the flyback or deflection yoke parts.

With the successful tuner replacement, I am very much ready to use a swapmeet tuner in my ham signal generator project. I hope you are just as successful working with digital TV tuners as I was.

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The Ins and Outs of Parts Substitution

Part 2: Specific devices.

With the diminishing availability of common semiconductors, hams are faced with substituting parts in order to implement circuits from the past. Many of the older circuit designs were excellent and provided a strong technical base for use in ham projects of today.

To implement older circuits, we as hams must be ingenious in our ability to locate and install available replacement semiconductors. Part 1 of this series discussed the steps involved in the substitution process; from searching for the "specific" part to examining the circuit parameters to enable the selection of a suitable replacement part. Specific transistor characteristics were obtained from available sources to create a table of device information in order to demonstrate how device parameters are compared for similarity. Knowing and matching the characteristics of both the old and new device greatly improves the likelihood of a successful device substitution.

Part 2 continues with those tools in mind and applies the process for substituting or replacing an FET. Because FETs are used in RF circuits as well as at low frequencies, the selection process involves a few more steps than those required for a junction transistor. In addition, ICs, op amps, and special devices will be discussed.

FETs

When it comes to substituting one FET for another, we really have our work cut out for us. FETs are designed in six different configurations, with most operating in a depletion mode and with some operating in the enhancement mode — making up a total of ten FET device configurations. A basic FET device configuration can be one of the following: JFET, single-gate MOSFET, or a dual-gate MOSFET. JFETs are depletion devices and function in a manner similar to a vacuum tube, except that the gate impedance isn't quite as high as the grid of a tube. Device current conduction increases when the gate swings toward the drain and decreases when the gate swings toward the source. Because of the reverse-biased gate of an FET, the input impedance is very high. In general, the output or drain impedance is similar to that of a junction transistor.

Many older circuit designs called for the use of a 2N3819, 2N4416, 2N5245, etc., junction FET. These can be replaced with an NTE 452 because the electrical parameters closely overlay. The replacement device supports both DC and RF functions closely matching the performance characteristics of the replaced device. Keep in mind that these FETs are interchangeable and will substitute for each other.

Some FETs are designed to function as a switch. When "turned on," the resistance between source and drain is very low, or high when "off." As a result the switch device is a very poor candidate for use in an amplifier circuit. Likewise, an amplifier-type FET would make a poor substitute for an FET switch. NTE does provide a series of suitable replacement devices for FET switches. Some enhancement FETs are used in a switch function when the R_{ds} (resistance, drain-to-source) value is low enough during a hard turn-on condition. Another parameter of an enhancement device to be considered during the selection of a replacement is the biased gate turn-on voltage. When used in an analog/linear function, the bias voltage is set to place the quiescent drain-to-source voltage at approximately the center of the operating swing between cutoff and saturation. Shifting the bias point to accommodate the application may be required if a direct replacement part is not available.

Perhaps the most common application for an enhancement FET is for use in audio, and coupled with a low R_{ds} parameter it is capable of controlling high-power circuits. The internal chip structure is made very large, allowing

the FET to handle a very large current. With a resulting large internal gate structure to support the FET control feature, the gate exhibits a high capacitance between the gate and source terminals. The capacitance value can be in the 1,000 pF range, creating a reactance value that effectively eliminates the power enhancement FET from being used in an RF environment.

Fig. 1 shows a junction FET used in a basic linear amplifier circuit. Knowing that an FET is used, the gate impedance can be surmised by examining the value of the R1 resistor. R1 effectively establishes the circuit's input impedance as long as the gate junction is reverse-biased. The circuit's output impedance will be approximately half the value of R2. The value of R3 is selected to adjust the gate bias value for linear operation. Substituting one FET for another in the circuit shown requires only the adjustment of R2 to achieve the desired gain and to adjust the value of R3 to set the bias for the desired linear operating point. Substituting a MOSFET for another in an audio/linear-type circuit follows the same logic and can be replaced using the NTE guide.

RF devices

Both RF transistors and RF FETs become the most difficult to substitute because of the numerous circuit parameters that are directly dependent upon a specific device when used in an RF environment. The most difficult devices to substitute are RF power transistors used in transmitter circuits. As a result, to consider substituting one device for another in an RF power circuit, one must be prepared to change the circuit design parameters to accommodate the "new" device. In general, the RF active board circuit traces, called striplines, are adjusted in length to be resonant at a given frequency and become the "impedance transformer" for a specified transistor.

Below 50 MHz, lumped inductors and capacitors are used in both the input and output matching networks. The input and output impedances of the transistor are known during the board's design phase and are accommodated by the impedance matching networks (lumped or stripline) connected to the transistor. The objective is to create a desired signal current drive level into the transistor's base circuit. As a simple example, if a replacement transistor is mounted into the circuit location designed for a different device, then the input and output impedances may be sufficiently different, preventing the stage to function as designed. As another example, should the substitute transistor exhibit a higher base inductance (L), a correction will be required to shift the reactance toward a resistive (R) condition. The shift can be accomplished by adding more capacitance directly at the transistor base resulting in a reactive shift from L toward R. When a match is achieved, the base drive current will be the highest at the operating frequency. Of course, the collector impedance value will have to be "corrected" in a similar manner to create an output match for maximum power transfer into the next circuit.

Receiver front-end circuits are a little more forgiving for part substitution than are transmitter circuits. One of the very early RF FET choices was the MPF 102 JFET. Being a VHF device, it opened the door for development of sensitive converter and receiver front ends. Some MPF 102 devices are still available from surplus sources. If desired, an MPF 102 may be replaced with an NTE 451 device.

To demonstrate the substitution process for a MOSFET, let's use the circuit shown in **Fig. 2a** as an example. Take note that the single-gate depletion MOSFET (may also be a GaAsFET) is used in a receiver's RF stage. After doing our extensive search for a replacement, we've determined that only a dual-gate GaAsFET is available. The spec parameters of the dual-gate GaAsFET may surpass those of the older single-gate FET, so that the substitution could be for the better. So our only recourse to "save" the receiver is to replace the single-gate FET with the dual-gate GaAsFET, and that means some mechanical and electrical design changes would be required in

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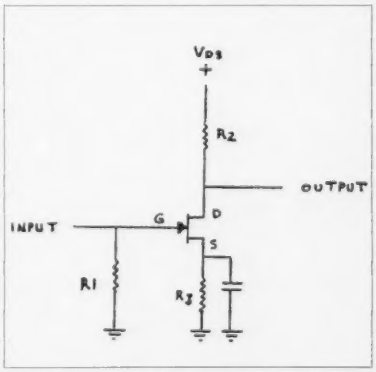
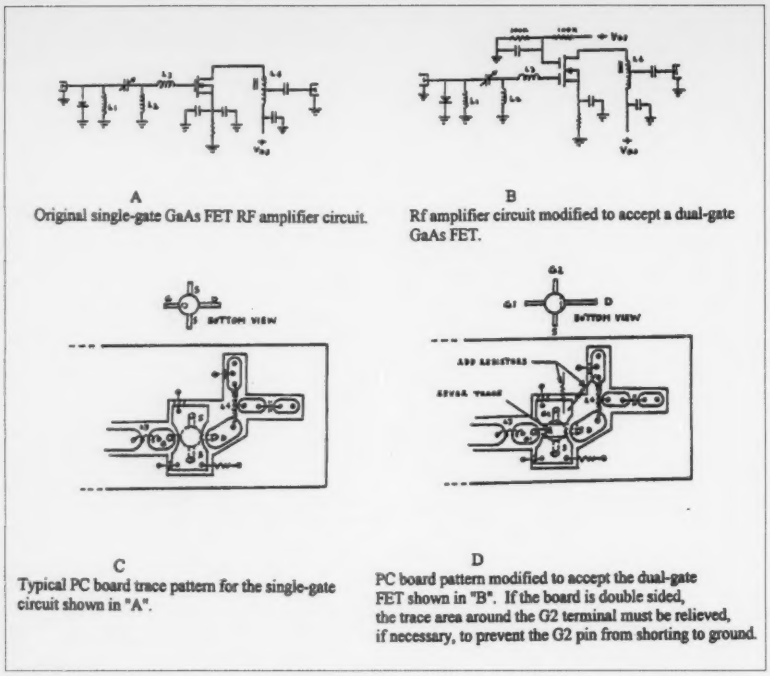


Fig. 1. A simple depletion JFET as used in a low frequency amplifier circuit. The input impedance is approximately equal to the value of resistor R1. The output impedance is approximately equal to one-half of the R2 value.



A
Original single-gate GaAs FET RF amplifier circuit.

B
Rf amplifier circuit modified to accept a dual-gate GaAs FET.

C
Typical PC board trace pattern for the single-gate circuit shown in "A".

D
PC board pattern modified to accept the dual-gate FET shown in "B". If the board is double sided, the trace area around the G2 terminal must be relieved, if necessary, to prevent the G2 pin from shorting to ground.

*Fig. 2. Steps involved in converting an RF amplifier circuit and PC board from a single-gate GaAsFET to accommodate dual-gate GaAsFET: (**a**) Original single-gate GaAsFET RF amplifier circuit. (**b**) RF amplifier circuit modified to accept a dual-gate GaAsFET. (**c**) Typical PC board trace pattern for the single-gate circuit shown in (a). (**d**) PC board pattern modified to accept the dual-gate FET shown in (b). If the board is double-sided, the trace area around the G2 terminal must be relieved, if necessary, to prevent the G2 pin from shorting to ground.*

The Ins and Outs of Parts Substitution

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the receiver for it to accept the GaAsFET installation.

Available GaAsFETs that will perform well in a receiver front end are a 3SK121 and a 3SK174. Both are dual-gate devices with an upper frequency cutoff of 2,000 MHz. Some caution must be taken when using a GaAsFET capable of 2,000 MHz in a low frequency circuit. Because of the wide bandwidth capability, long leads within a low frequency circuit could easily support sufficient feedback for the GaAsFET to oscillate. When the choice is available, it is better to more closely match the frequency response of the substitute device with that of the application. NTE provides two dual-gate MOSFETs suitable for most general circuit applications — they are an NTE 454 (200 MHz), and an NTE 455 (900 MHz).

When it becomes necessary to modify the original circuit to replace a single-gate FET with a dual-gate FET, as shown in **Fig. 2**, the following steps are suggested:

(1) Draw out a near to-scale picture of the current FET installation and the surrounding resistors, capacitors, and inductors (**Fig. 2c**).

(2) Draw out the electrical schematic for the existing FET circuit (**Fig. 2a**).

(3) Draw out the schematic for the GaAsFET circuit so as to "fit" or overlay the single-gate circuit with the dual-gate circuit (**Fig. 2b**).

(4) Lay the GaAsFET onto the drawing (#1 above) so that it overlays the single-gate FET footprint. Keep track of the top and bottom side of both the FET and the circuit board.

(5) Make note of the mechanical mounting differences between the two FETs.

(6) Plan the circuit board mechanical changes required to accommodate the GaAsFET (**Fig. 2d**).

(7) Plan where the additional bias resistors will be placed when the GaAsFET is installed.

In step 5, the major differences to be accommodated are the source pins of the flat-pack single-gate device. Both source pins are internally connected in parallel to balance the I/O reactances, and are connected externally to "ground," or through a bias network to ground. The footprint of the dual-gate FET exhibits only one source lead connected to "ground." The opposite lead from the source is the second gate (G2). To accommodate the device substitution process, one "ground" pad for the single-gate device must be isolated from ground, or the bias network, to accommodate the G2 gate of the dual-gate FET. With the pad isolated, the necessary resistor(s) and capacitor may be attached to the pad to support the second gate.

ICs

Substituting IC's is another story. IC's, better known as "integrated circuits," are complex circuits made up of a great number of semiconductors integrated onto a silicon chip with the whole to perform a designated function. Because of the unique function of each specific circuit, the opportunity of finding "another" IC that will function in a like manner is unlikely. However, the possibilities that exist are some basic functional parallels between the early RTL, DTL, and select few of the later TTL and CMOS IC's. With the technological differences between them, some supporting external circuit design considerations must be made for an application to function. When one considers the advancement in the TTL and CMOS series of IC's, there seems to be little need to implement an old RTL or DTL circuit utilizing the later technology since the later technology has so much more functional capability — including reliability.

There are some possible substitutes between the 74XX and 4XXX series of logic ICs should the "need" arise. If implementing a logic circuit from scratch, it is perhaps a better choice to choose one single family of ICs rather than to mix families, even though both

may function well with a supply voltage of 5 VDC. Because of the logic threshold voltage differences between TTL and CMOS, though slight, the overall logic function might occasionally glitch when operating at clock speed. However, low speed and step functions are generally accommodated properly even though the families are mixed.

Operational amplifiers

Op amps, unlike digital ICs, are a little easier to substitute. Op amps differ in their performance characteristics, but the basic analog amplifier function of each will adapt to a great many applications. An obsolete or hard-to-find op amp indicated in a schematic can usually be replaced by a later part. The external biasing and feedback networks are fairly constant for most op amp circuits, providing for a routine substitution process as long as the mechanical footprint differences are accommodated.

One of the early op amps is the LM741. Though old in design, it is still a suitable building block for a lot of usable circuits. A dual version of the LM741 is the LM1458 with all of the variants that followed, including the 4558 that was called a precision op amp. The early versions of op amps suffered greatly from "noise" that could be heard as a hiss when the device was used in audio systems. Later versions incorporated JFET input circuits both to reduce the internally generated noise and to raise the input impedance. Because of the large manufacturing volume of the more common op amps, parts continue to remain available for ham applications. Should the need arise, NTE provides a variety of op amps that will replace many of the older part numbers.

Special purpose devices

Over the years, a great number of specialty parts have been developed and then abandoned. One that comes to mind is the tunnel diode. When it was first developed, applications flourished because it was so revolutionary, but being a two-lead device, the total number of applications was limited. The transistor, being more of a universal device, had a wider application capability, and as a result, the tunnel diode fell by the wayside. However, many older circuits still exist that call for a tunnel diode. The Heathkit Tunnel Dipper comes to mind, and because the tunnel diode is a two-lead device, there is no direct substitute for it. Should it be necessary to repair the dipper's function, it's possible that the circuit can be converted to accommodate a transistor.

Another device that is now considered as obsolete is the unijunction transistor. The uni was a very popular device used in oscillators and timing circuits, and for the making of sawtooth generators. Even though the familiar unijunction device is scarce these days, many of the circuits calling for the device can be modified slightly and made functional using a PUT. A PUT is a programmable unijunction transistor that will perform all of the same functions as the original uni, but with the addition of a bias voltage network that's used to establish the "firing" point.

Because of the wide variety of specialty semiconductor devices, it's difficult to provide a general "fix" for the substitution process. At best, I'd suggest that the circuit/application be examined to determine the requirements being imposed on the device. Once those requirements are understood, perhaps a replacement device can be identified along with any circuit changes that might be required to support the replacement device.

Conclusion

Over the years, many circuit designs have been developed to support radio and electronic circuits, with a great many being applicable to ham radio. As the years have passed, the active elements (tubes and semiconductors) used in radio and electronic circuits have evolved, yet very little in the basic circuit design has changed. However, the active element (semiconductor) has been improved, allowing the older circuit designs to perform with renewed vigor.

As we review many of the old circuits,

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we occasionally find one of interest and desire to implement it into a project. But to implement the circuit we have to upgrade the active element to one that's available, and that's where we typically run into a problem.

How do we identify a modern device to replace the old device shown in the schematic of our desired project — particularly when our parts supply is shrinking. The "fun" begins with a journey through a search process leading us through catalogs, reading specification sheets, doing Internet searches, and doing design overlays to identify parallels between old and new parts. In some cases, it becomes necessary to make minor circuit and circuit board design changes to accommodate the newly selected replacement part.

From my observation, the person who gains the most from the substitution process is the person who learns how to work their way through the process maze. 73!

Reference and search information

(note: This is only a representative/sample listing.)

Books

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D.A.T.A. Reference Standards
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Catalogs

Allied Electronics, 1-800-433-5700.

Digi-Key, 1-800-344-4539, [www.digikey.com].

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Jameco, 1-800-831-4242, [www.jameco.com].

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[http://listserv.lehigh.edu/lists/qrp-l/], group information.

[qrp-l@Lehigh.EDU], post messages to QRP-L.

[gqrp-subscribe@yahoogroups.com], GQRP message group.

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Circuit Solutions, [http://www.cirsolutions.com/head.htm]

Excess Electronics, [http://www.excesstrade.com/]

IhI Electronics, [http://www.ihielectronics.com]

Obsolete Semiconductors, [http://www.adsemi.com/]

Rochester Electronics, [http://www.rocelec.com/]

Star Electronics, [http://www.4star-electronics.com/]

Parts suppliers

1-Source Electronics, [www.1source-components.com].

All Electronics Corp., PO Box 567, Van Nuys CA 91408; 1-800-826-5432; [allcorp@allcorp.com].

B&D Enterprises, [www.bdent.com].

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Simple Test Circuits

Here are some fun little projects from a veteran Poptronics *contributor.*

Ham radio is one of the most versatile hobbies we could have, bar none. Think of it, what other hobby offers so many avenues to follow? There are so many ways to transmit and receive information, with numerous modes and modulation types including voice, video, and digital.

However, one very important fact stands out: From the very beginning, the first experimenter built his own transmitter, receiver, antenna, and anything else needed to complete a working radio station. Today, with the complexities involved in almost every rig manufactured, what can a ham do?

Building can still be one of the most enjoyable activities of being a ham radio operator. Of course, most of us are not capable of designing and building a complex transceiver, but most of us can build very useful accessories that can add to the enjoyment of our hobby and save some bucks at the same time.

No matter what we end up building, it usually requires some type of electrical power. The two common choices are batteries and AC-operated supplies. If operated in the field, away from AC power, the choice is batteries; AC is the practical choice for in shack operation.

Direct plug-in power supplies are found in great numbers powering everything from shavers, wireless phones, radios, and many other devices, which may have a useful after life in powering our ham projects.

Usually the power supplies outlast their appliances and end up in closets, drawers, and our treasured junk box. Two of the most useful types of wall-warts are the ones with built-in full-wave rectifiers. **Fig. 1A** shows a full-wave bridge rectifier circuit, and **Fig. 1B** shows a centertapped transformer full-wave rectifier circuit. Generally, the DC output voltage and current ratings are listed on the transformer; however, the actual output voltage most often will measure higher than the labeled voltage. The labeled voltage usually refers to the output under load or after being regulated by the appliance.

I have yet to find a wall-wart with an onboard regulator. **Fig. 1C** shows a simple IC regulator that can be connected to the output of most wall supplies. The wall-wart's actual supply

Continued on page 32

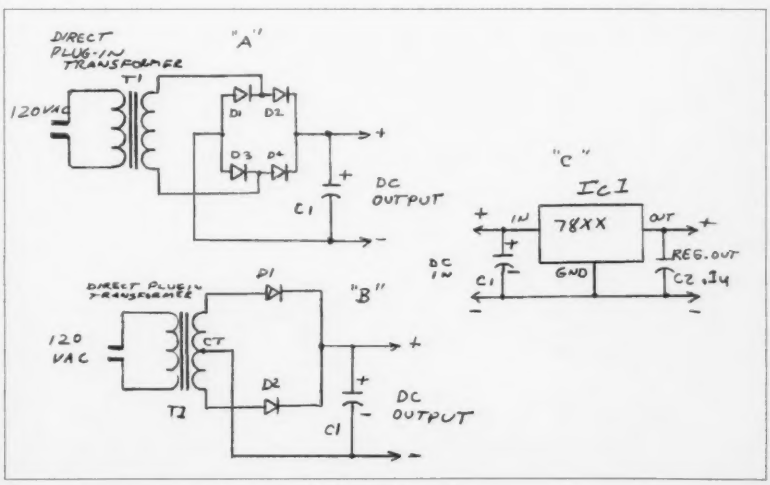
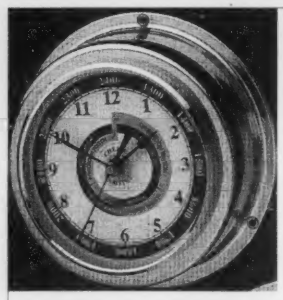


Fig. 1. *Basic wall-wart circuits and add-on IC regulator.*



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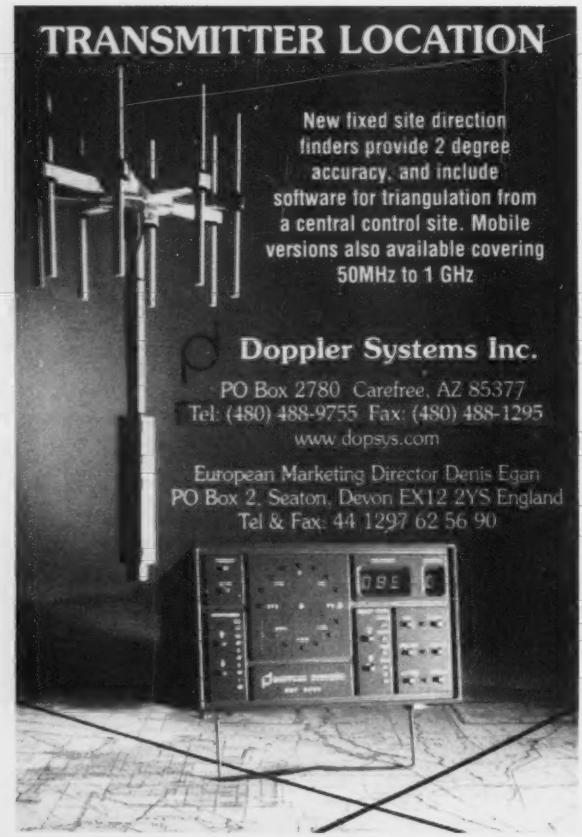
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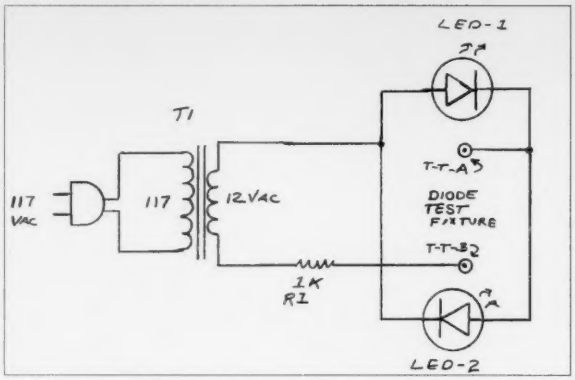

Fig. 2. AC-powered diode tester.

Simple Test Circuits

continued from page 31

voltage must be several volts higher than the regulator's output (minimum of 3 volts differential).

Most wall-warts output a raw DC voltage, relying on the appliance to supply the filter/storage capacitor. A majority of the wall-wart supplies that I've found are rated below 1 amp in output, with most in the 100 to 500 milliamp range. Adding at least 1000 µF to the raw DC output before connecting to the regulator IC is a good starting place. As the output current demand goes up, so does the need for additional capacitance.

Diodes, diodes, and more diodes fill my junk box — and so many without credentials. Since we use so many diodes in our circuits, it's always a problem to sort the good from the bad ones; however, that no longer needs to be the case. Our next three diode testing circuits will do that job just fine.

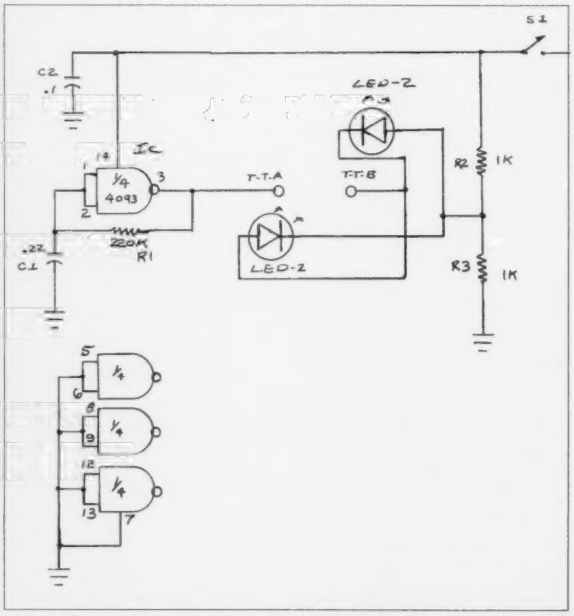

Fig. 3. Battery-powered diode tester.

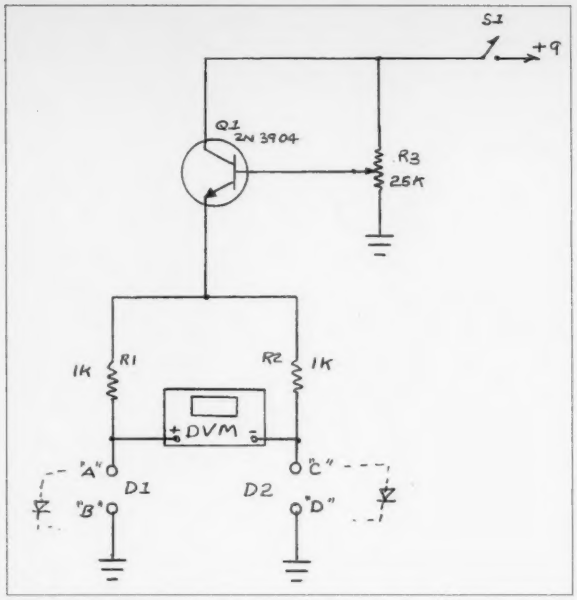

Fig. 4. Matching diode test circuit.

The first diode testing circuit — see **Fig. 2** — will help to determine the diode's anode and cathode leads and whether the diode is open or shorted. A low-current 6 to 12 volt transformer, a resistor, and two LEDs are all that are needed for this simple diode testing circuit. Here's a good place to use that wall-wart that does not have built-in diodes and is an AC-only output device. The two LEDs are connected in parallel in opposing polarity and are in series with the diode test terminals.

Connecting an unmarked diode to the test terminals will produce one of the following results. If LED-1 lights, the diode's anode is connected to test terminal "A", and the cathode to terminal "B". If LED-2 lights, the diode's cathode is connected to test terminal "A" and its anode to terminal "B". If both LEDs light, the diode is shorted, and if neither lights, the diode is open.

A battery-operated version of the diode tester is shown in **Fig. 3**. The AC supply is replaced by a single gate astable oscillator circuit, which supplies a square wave AC voltage for the test circuit.

A good diode with its anode connected to test terminal "A" and its cathode to terminal "B" will light LED-1. LED-2 lights when the cathode of the diode under test is connected to the "A" terminal and the anode to the "B" terminal. This tester will also light both LEDs when a shorted diode is tested.

Often a circuit will require a pair of matched diodes with the same forward resistance and voltage drop. The circuit in **Fig. 4**, along with a digital voltmeter, will do the trick. Q1, a 2N3904 NPN transistor, is connected in an emitter-follower circuit supplying a resistance bridge circuit with a variable voltage source. Two matched 1/4 watt, 5% 1k resistors make up one-half of a basic resistor bridge circuit, and the diodes under test make up the other half.

When R1 = R2 and D1 = D2, the voltage at the DVM will be zero, indicating a perfect balance, or match. Any voltage reading indicates a mismatch

Continued on page 53

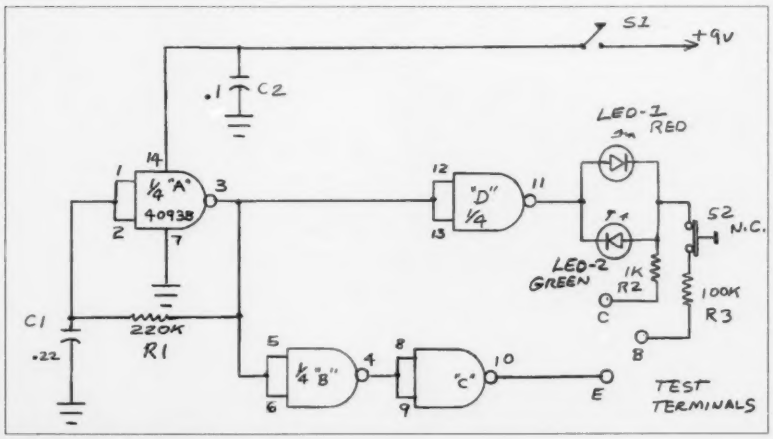

Fig. 5. NPN/PNP transistor checker.

Parts list for Fig. 1	
	Direct plug-in power supplies
	78XX-type voltage regulator suitable for wall-wart used
Parts list for Fig. 2	
T1	12 VAC wall-wart transformer with output of at least 50 mA
LED-1, LED-2	LED, any color
	Test terminals
Parts list for Fig. 3	
C1	0.1 µF disc ceramic
C2	0.22 µF disc ceramic
IC	4093 quad 2-input NAND Schmitt trigger
R1	220k 1/4 W 5%
R2, R3	1k 1/4 W 5%
S1	SPST power switch
B1	9 V transistor battery or power supply
Parts list for Fig. 4	
Q1	2N3904 NPN transistor, or similar
R1, R2	Matched 1k 1/4 W 5%
R3	25k pot
S1	SPST power switch
DVM	Digital voltmeter
	Test fixture
Parts list for Fig. 5	
C1	0.22 µF disc ceramic
C2	0.1 µF disc ceramic
LED-1	LED, red
LED-2	LED, green
IC	4093 quad 2-input NAND Schmitt trigger
R1	220k 1/4 W 5%
R2	1k 1/4 W 5%
R3	100k 1/4 W 5%
S1	SPST power switch
S2	Normally closed push-button switch
	Test terminals

***Table 1.** Parts lists for the various figures.*

73 Review

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Test Time for the SG-2020 Transceiver

"If operating were any more fun, it would be illegal!"

In many Asian cultures, turning 60 is cause for celebration. Not so at our home in Smyrna, Georgia. My 60th birthday (August 2002) was met with cries of "You're older than dirt," but on the other hand, it was accompanied by the sort of birthday gift only a ham could enjoy — my very own SG-2020 transceiver.

While there is no shortage of small to tiny transceivers available to the ham market, the SG-2020 is described by the manufacturer, SGC Inc., as a "tactical transceiver," and a quick glance at the unit makes you wonder if it would be as at home in a Bradley Fighting Vehicle or Main Battle Tank as it would be on the ham shack desk.

Scarcely more than a handful, the 2020 packs a large number of features into a very small package (2.75" H x 6" W x 7" L) weighing in at approximately 4.4 pounds. The specific variation I received included the ADSP (audio digital signal processing option), and the balance of this review will explore the transceiver and its operation, with the latest (April 2003) enhancement of an updated ADSP option that was retrofitted to my transceiver. I'll also be sharing my experiences (see sidebar) with the original ADSP-equipped transceiver.

Briefly, the SG-2020 is a 20 watt (adjustable) SSB/CW transceiver capable of operating on the ham bands from 160 to 10 meters. While you can receive AM broadcasts by using either the upper or lower sidebands, you have to bypass the broadcast filter for reception of signals in the 400 to 1600 kHz bands, assuming that you would ever want to dedicate a transceiver to a function more aptly served by a less-than-$10 radio. For those interested in and licensed to operate as a MARS station, "unlocking" the transceiver to permit operation at other than those frequencies assigned to the Amateur Radio Service requires only the removal of three screws and the use of the thumb and forefinger to remove a Berg jumper from the circuit board — a pleasant surprise when compared to the multistep techniques required by most of today's amateur transceivers. In fact, the modification nearly takes longer to read than it does to perform.

***Photo A.** SG-2020 transceiver.*

What your ham dollar gets you

For less than $800, you get a low-power, fully functional transceiver capable of operating on the ham bands in CW/SSB modes and fully capable of operation in the digital modes. It's not strictly a QRP transceiver, but rather, I would characterize it (based on my experiences) as a low-power, full-featured transceiver that can be used as a QRP rig, or for that matter a

Pin	Function
1	Mic audio
2	PTT
3	OPT1 (not used)
4	OPT2 (not used)
5	N/C
6	Phone (Rx audio)
7	Mic ground
8	Ground

Table 1. *Microphone pinouts (viewed from front of radio).*

low-power, high-performance transceiver as at home in the shack as it is mobile in the car. In fact, its small size and reasonable power requirements (12-18 VDC at 5 A maximum) make it ideal for portable operation as well as fixed station/mobile use. We made up a fused cigarette lighter adapter and have made many QSOs from our car(s) using anywhere from 5 watts to full power and have yet to run the battery down to the point (and we have been known to be long-winded) where the car would not start.

By comparison to most of the amateur transceivers, the front panel is Spartan. The controls are easy to reach and intuitive in operation and the large tuning knob makes frequency changing relatively easy. On power-up, the easy-to-read display informs you of the input voltage and the revision number of the transceiver, and then shifts to displaying the current or last-used frequency. The 8-pin microphone connector on the front panel can be used for direct digital interface (PSK31, RTTY, etc.) and is compatible with the pinouts for Kenwood. The pinout designations are shown here in **Table 1** to facilitate fabricating a suitable soundcard interface.

The are five other user-accessible connectors. Two are on the front panel, the remaining three are on the rear panel. These include:

Sleeve	Ground
Ring	Dash
Tip	Dot

Table 2. *Stereo jack pinouts.*

• PAD (Paddle), a 3.5 mm stereo jack to permit connection of a user-supplied keyer paddle to the internal iambic mode B electronic keyer variable in 1-word-per-minute increments from 5 WPM to 45 WPM and 5-word increments from 45 WPM through 60 WPM. Pressing and holding the SPEED button on the front panel and turning the main tuning knob adjusts the speed and displays the speed on the LCD meter. The wiring configuration is shown in **Table 2.**

• KEY (Key), a 3.5 mm mono phone jack provided to interface with a CW hand key. The key will see +5 volts at a few milliamperes. The SG-2020 is set up for full break-in operation and transmits when the key is closed, or when in the CW mode and the microphone PTT is depressed. A sidetone of 650 Hz is present.

• Antenna (rear panel). Although identified in the manual as an SO-239 connector, the antenna connector is made up of a coaxial "doggle" providing an in-line SO-239 whose other end is connected internally to the transceiver through an appropriate strain relief device. The transmitter expects a 50 ohm matched load at the operating frequency.

• DC Power (rear panel). Again incorrectly identified in the manual as a 3-pin in-line screw terminal, the DC power connector consists of a length of 2-conductor (red/black) stranded wire, overcovered in heavy insulation and terminated in two (polarized) quick connect (Sta-con) terminals. The other end of the power cable is connected internally to the transceiver through an appropriate strain relief device. Mating connectors (one male, one female) are supplied with the transceiver for interface to the user-supplied power source. Suggested wire gauge for power connections (mobile installations) is AWG #12 stranded.

• External Speaker (rear panel). The external speaker/earphone connector is a 3.5 mm stereo jack. An external speaker or Walkman-type stereo headphones may be connected via this jack. When this connection is used, the internal speaker is automatically disconnected.

The front panel controls and indicators

For the most part, the front panel controls are intuitive. The prerequisite AF and RF Gain controls are present, the Power on/off and a large easy-to-use tuning knob are just about where you'd expect them to be in a well-designed transceiver. Push-button switches are used for functions such as Power, Light (internal backlight on/off), Speed (for CW keyer), XVCE, RIT, NB, and SPLIT, all the same types of controls we are used to on any transceiver. However, there are a few unique push-button switches that perform specialized functions either alone or in conjunction with other controls. Let's explore their function and use:

• PBT (Passband Tuning). Pressing this button activates the passband tuning, and using the main tuning knob while pressing the PBT will change the passband offset as desired. The adjustment rate is from –1000 Hz to +300 Hz in 100-Hz steps and will be displayed on the LCD. Note: Accurate calibration is not supported in passband tuning.

• FAST (Fast). Pressing the FAST button while using the main tuning knob will set the tuning rate to one of four different values: 0.1 kHz; 0.5 kHz; 1 kHz, or 10 kHz. The normal tuning rate is 0.1 kHz. This feature will enable you to QSY rapidly (more about this later).

• MEM (Memory). In place of the usual bandswitching arrangement, the SG-2020 has 20 user-accessible memories. From the factory, the SG-2020 comes with the memories preset to a few frequencies in each amateur band for user convenience. However, these preset memories can be changed by the user at any time. While not numbered (as such), these memories can permit you to store frequently used frequencies for nets, special applications, etc. **Table 3** shows the factory presets as shipped:

Each memory retains the following parameters: Receive frequency, Transmit frequency, Mode, XCVE/RIT/SPLIT, Bandwidth setting, and Transmit output. Memories can be returned to the factory defaults by pressing the

Memory	Frequency (kHz)
1	1850
2	1950
3	3700
4	3900
5	7040
6	7140
7	7239
8	10105
9	10125
10	14050
11	14150
12	14300
13	18100
14	18150
15	21050
16	21350
17	24900
18	24950
19	28200
20	28450

Table 3. *Factory default memory presets (note: Channel numbers are not assigned or displayed).*

CMD+Split	Function	LCD Display
Not activated	No noise reduction	No colons
Press once	Original ADSP (13 dB)	One colon
Press twice	ADSP2 (26 dB)	Two colons

Table 4. *Initiating ADSP2 noise cancellation.*

CMD+BMW	Function	LED Bar Graph
Not activated	No filters	No LEDs
Press once	1800 Hz bandwidth	Three red LEDs
Press twice	500 Hz bandwidth	Two red LEDs
Press three times	100 Hz bandwidth	One red LED

Table 5. *The initiating process and enhanced bandwidth filters activated by a combination of the CMD+BW keys. Note: Each activation steps to the next filter or DSP level in a loop. For example, the ADSP2 will step through 13 dB reduction, then 26 dB noise reduction, and then back to no noise reduction. The ADSP and filters can be used in any combination.*

MEM button while turning the power ON. New memories are stored by first tuning the frequency, setting the mode and other parameters, and then pressing and holding the FAST button and pressing the MEM button. This will overwrite whatever information is stored in that particular memory location with the new information. You go from memory location to memory location by pressing the MEM button and turning the main tuning knob to the desired frequency. A simple chart showing those frequencies you have set up will be helpful — remember, the channel numbers are not assigned, and therefore not displayed. There are merely 20 user-accessible locations.

• BW (Bandwidth). Pressing the BW button will display the receiver bandwidth on the LCD. Turning the main tuning control while holding the BW button will change the bandwidth in 100-Hz steps from 100 Hz to 2.7 kHz.

• Mode Selection (BW+REV). To display the current operating mode (CW/USB/LSB) press BW. To select another mode, hold BW and momentarily press REV until desired mode appears on the LCD. Release BW to return to the frequency display.

Secondary switch functions

• Bar Graph Mode (CMD+LIGHT). Pressing the CMD and LIGHT simultaneously changes the bar graph display from "full" bar to "peak" bar display.

• DC Input Voltmeter (CMD+Speed). Pressing and holding CMD and SPEED simultaneously but momentarily will cause the LCD to display DC input voltage. This will be displayed until you: (a) move the tuning knob; (b) initiate transmit in CW mode; or (c) depress any of the following keys — CMD + any other key, SPEED, PBT, MEM, or BW.

• TX Output Power Adjust (CMD+NB). Pressing and holding CMD and NB simultaneously but momentarily, the TX power level is adjustable by turning the main tuning knob. Adjustments can be made in increments of approximately 1 watt from 0 to 20 watts. To enter this setting in the last recalled memory, you would press FAST+MEM. To return to the frequency display, press MEM. Accurate calibration is NOT supported.

• MEM SCAN (CMD+PBT). Pressing and holding CMD and PBT simultaneously but momentarily will initiate a scan of the 20 memories. To stop the scan, press any button or transmit. The scan variables (Dwell, Pause, Detection Threshold, Audio Blanking Time and Frequency Steps) are adjustable via CMD+REV.

• ADSP2 NOISE CANCELLATION (CMD+SPLIT): The latest variation of ADSP is activated by a combination of the CMD and SPLIT keys. Hold down the CMD key, then press the SPLIT key and release both. The degree of noise cancellation is determined by the commands issued as shown in **Table 4.**

• ADSP NOISE CANCELLATION (ORIGINAL), CMD+BW. The original ADSP was initiated in either an On or Off mode (13 dB reduction) by pressing the CMD+BW keys.

Transceiver in general

All in all, you get a great deal of radio in a small package for a reasonable price. But, now that we've explored some of the highlights you do get, let's take a look, warts and all, at some of the things you don't get. And if they aren't there, do you really need them?

What you don't get with the SG-2020 (or, Do you really need them?)

• FM Operation: The SG-2020 does not permit FM operation, but is it really a must-have on a small transceiver that covers 160 through 10 meters? I didn't think so; all that would be lost is some activity on 10-meter FM, which frankly I have yet to hear, or for that matter get too terribly excited about doing. The same argument, with a bit of qualification, could be made about VHF/UHF capabilities. There's just so much technology you can cram into a small box and have it work well, and most important, dependably. I prefer to reserve VHF/UHF communications for the main station rig (ICOM 746 PRO or the van's ICOM 706 MKIIG). What I wanted, and the SGC-2020 provided was a portable rig I could take

Reviews are usually crammed full of specifications, tables, theories of operation, and the like, but no matter what the text says or the meter reads, the proof of the "pudding" is in how well the item works, or how badly it worked in actual use.

My experiences with the SG-2020 have been excellent to say the least. The review article mentioned a contact on 160 meters, which gives you an idea of how well it works in a worst-case scenario, but let's look at, for lack of a better term, a "best-case scenario." Specifically, the diary of a QRP contact with Asiatic Russia.

On the date in question, 23 September 2002, 0230 UTC, I was seated in my shack and had just connected my SG-2020 to the best antenna in my antenna "patch," a B&W wideband (160–10m) dipole at some 30 feet pointed north/south. I allowed a few minutes warm-up time on 20 meters while I found a pencil, some paper, and a cup of hot coffee, and began to tune around the band listening for DX stations.

I'd previously set the power out on the SGC-2020 to an indicated 5 watts so that any contact I made would indeed qualify as a QRP SSB contact. I verified the power out setting one more time and heard a strong signal — UA9CUA calling QRZ — and the usual collection of rascals forming a pileup.

I reached for the microphone and gave my call "Whiskey Four Poland Germany Italy QRP" twice. To my amazement, Fred UA9CUA in Krasnouralsk, Russia, returned with "Only the QRP station, please." To my further amazement, the other hams relented and I established contact with Fred, and exchanged pleasantries and signal reports.

He was a solid 5/8-9 into Smyrna, Georgia, and he reported my signal as 5/4 and very easy to copy in Russia. I dashed off a QSL to his US QSL manager and didn't think a lot about it until I checked the map and realized just how far I'd reached out with an indicated 5 watts SSB.

Some time later, I received his QSL card. At that point it really sunk in, and I tried to determine just how far in miles he actually was from my QTH, which was no easy matter. Once I'd arrived at a figure, I determined that I'd probably qualified for the 1,000 Mile per Watt Achievement Award. I sent off a copy of my QSL together with the necessary paperwork, and received the certificate.

According to the Awards Manager, my QSO amounted to 1,468 miles per watt, the distance from the home QTH at 33.52N, 84.40W, and Fred's location at 31.6N, 60.04E.

Well, it appeared that the SG-2020 not only could hear signals from afar but could at relatively low power transmit as well. Not wishing to rest on my laurels, even though the award is framed and prominently displayed on the shack wall, I tried my hand at PSK31 using a suitable interface and my laptop computer. SGC recommends not operating in the PSK31 mode above approximately 10 watts.

Photo SA. QSL card from Russia.

I played it safe, and on my first contact worked into Canada using an indicated (again) 5 watts. I received a 5/9 signal report on my first QSO, and similar reports later that day from stations in Pennsylvania and Nevada on 20 meters.

So if operation is the key to how well a rig works, then take it from me and my certificates, the SG-2020 works extremely well and has continued to do so at a variety of power levels, on different frequencies, and without resorting to high-gain directional beam antenna farms — just my lowly dipole and once or twice a Hamstick in the car.

Naturally, your results may vary, but definitely get your hands on the SG-2020 and try this at home. You'll be glad you did.

QRP AMATEUR RADIO CLUB INTERNATIONAL

1000 Miles Per Watt

ACHIEVEMENT CERTIFICATE

BE IT KNOWN THAT

Elliott S. Kanter W4PGI

1468 Miles Per Watt

Photo SB. This certificate represents a 1,468 miles-per-watt QSO.

General	
Operating modes	USB, LSB, CW
Receiver frequency range	400 kHz to 29.7 MHz; however, receiver display will be slightly uncalibrated below 1.6 kHz
Transmit frequency range	1.8 to 29.7 MHz (U.S. ham bands only)
Export version capable of general coverage transmit	1.8 to 30 MHz
Operational temperature range	–30 to +70 C
Microprocessor	MC68HC711E9
Frequency stability	3 ppm per 10 C; example — at 14.2 MHz, equal to 14.2 x 3 = 42.6 Hz, a total frequency drift of 42.6 Hz for a temperature change of 10 C; i.e., if the temperature changes from 20 to 30 C, there could be frequency drift of 42.6 Hz
Frequency resolution	10 Hz steps
Frequency display resolution	100 Hz steps
Receive transmit changeover	Less than 10 milliseconds
User-friendly functions	SPLIT, RIT, XIT
Memories	20 simplex or semiduplex
SWR metering	Built-in
LCD display	Backlit
Keyer	Fully adjustable iambic B mode keyer operating under microprocessor control from 5 to 60 wpm
Dimensions	2.75H x 5.9W x 7L inches
Approx. wt.	4.4 lbs.
Microphone	Fist, dynamic, included (comparable to Kenwood MC43 or similar)
Battery voltmeter	Digital, front-panel-controlled
Receiver	
Sensitivity	Better than 0.3 V for 6 dB S/N
Intermodulation	+18 dBm 3rd order intercept
Tunable AF bandpass	100 Hz to 2700 Hz
Audio output	1 watt RMS
AF distortion at nominal output power	Less than 3%
Noise blanker	Front-panel control
RF gain control	Front-panel control
BFO	Microprocessor-controlled
Typical consumption in receive mode	Less than 500 mA*
Transceiver	
Transmitter power	Adjustable from 0 to 20 watts PEP output, with efficient operation at 5 W
RF speech processor	VOGAD baseband processing and RF clipping
Transmit current	5W CW: less than 2.5 A*; 20 W CW: less than 4 A*
Transmit intermods for 20 W PEP	–28 dB or better
Transmit spurious and harmonics	50 dB (from PEP power) ham bands
*Note: Current measurements were made with a DC supply of 13.7 V using a 3-1/2-digit DVM and take into account all available options (e.g., panel lamp and ADSP2 active, volumne at comfortable room listening level). Your actual measurements may vary.	

Table 6. *Specifications. *Note: Current measurements were made with a DC supply of 13.7 volts using a 3-digit DVM and take into account all available options (e.g., panel lamp and ADSP2 active, volume at comfortable room listening level). Your actual measurements may vary.*

nearly anywhere, operate off a gel-cell battery, and have fun with, not to mention use fixed as a QRP rig.

• Bandswitching — or at least a more conventional method of going from one band to another. It would be nice, but in reality, how many different frequencies do you operate on in each band? If you look back at **Table 3**, you can get a lot of mileage out of the factory-default memory settings. If not, you have a total of 20 memory positions for programming your favorite "watering sites," and the ability to tune between them. For me, I have considered loading the QRP and Pedestrian Mobile frequencies into memory and going from there. The lack of a quick bandswitching scheme is hardly a defect. If you are spoiled by one-button access, then you actually have a pseudo-one-button access by pressing the MEM button and turning the main tuning knob to go from one memory channel to another — no big deal.

• VOX: A voice-operated relay would be nice, but having that feature on both my main and mobile rigs, I've discovered that at times it's not all that helpful, especially with high background noise and false activations or dropouts. Again, it would be nice, but for years hams used push-to-talk, and with a rig this feature-laden, I would be loath to give up a must feature for one that is merely a convenience — sometimes.

• Speech Compressor: Most rigs have them, many hams misuse or misadjust them, and the VOGAD speech compression present in the SG-2020 has proven to me that it's not a carved-in-stone necessity. In fact, about two months ago in the early evening, I fired up the 2020 on 160 meters, full QRO (all 20 watts give or take a microwatt), and tried a CQ. Now, later I found out that what I did took guts. Most people on 160 are running a good deal of power, and very few of them run what could best be described, at least on 160, as QRP. To make a short story a bit longer, I had a station in southern Illinois come back to me with this comment: "I had to come

Continued on page 54

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Study Guides That Pass the Test

Presenting a review of the best books on basic radio.

Being interested in radio, we should be well acquainted with the basic principles and have a broad understanding of radio circuits. Whether a hobbyist, experienced engineer, or technician, we can always increase our knowledge through understanding.

Enjoyment of radio can be improved when we feel comfortable with "how" and "why" radio works. Whether you have had a lifetime of experience or are just starting out, sometime facts or theory or fundamentals are just a little fuzzy and in need of review. Perhaps you have just forgotten some details.

Of course, our favorite hobby magazine, our friends with similar interests and "Elmers" are invaluable resources. But no matter what resources we use, most often we turn to a good textbook for help and in-depth study. Have you ever wondered about the best basic radio textbooks available for study and reference?

Radio expanded at a phenomenal rate once it took hold. By the late 1930s authors were writing volumes with an improving knowledge of basic radio. Today, radio is well understood, and many textbooks have been written since that early beginning. In fact, so many books have been written that finding just the right one for study can be an arduous task. Most of us have relied heavily on textbooks for study and learning radio technology. But not all textbooks, or authors, are created equal. Therefore, a review of some of the most recommended textbooks for our hobby, both current and otherwise, should be of interest.

A major commitment to reading and understanding is time. One has to ponder theory and concepts before understanding emerges. In our busy lives, some discipline is required to allocate blocks of time to study. It is my hope that this discussion will shortcut the process by helping select textbooks worthy of your valuable time.

Many textbooks on the basic principles and theory of radio have been studied and reviewed. The intent was to find textbooks that are standouts. Analysis included the author's approach that must assume one was acquainted with intermediate electrical principles but struck a balance between introductory material and more complex subjects. To be recommended, the textbook must hold your attention and be interesting.

In addition, having been associated with modern electronics and education for many years, a need was established to improve my own understanding as a collector and restorer of vintage radios. This study helped not only to electronically restore them, but to improve my understanding of how they worked. Thus, my study necessarily included tube-type classical theory, which transferred to modern solid-state theory as well.

Some may view a study of classical textbooks as a waste of time, but I assure you it will only improve your understanding and enjoyment of radio. One can visualize the evolution of radio by studying the classics. Our roots are grounded in the classical technology. To be a well-rounded amateur, we should know vacuum-tube basics as well as modern solid-state technology. After all, the basics of radio hold up whether you are discussing classical or contemporary. Good classical textbooks were not excluded from this study just because their discussion centered on vacuum-tube technology.

During my study of the current and classical textbooks, some seemed to be much better than others in explanation and clarity. A large cross-section of texts was selected for study. Trying to cover the most popular contemporary, and classical radio textbooks is a difficult task. Since radio came on the scene, many textbooks have been written. My selected list is certainly not exhaustive, but included those most popular and available today. Each will

not be critiqued here, but only the top group recommended by my colleagues and me.

In addition to textbooks, numerous home radio course-books or manuals are still available and can be studied. After WWII, many schools offered mail correspondence courses aimed at veterans. Being offered within correspondence courses, many people, hoping to enter radio and TV repair, got their introduction to radio. These are worthy of your consideration as well, but will not be reviewed or considered here. Some of the more popular were National Radio Institute, Cleveland Institute of Electronics, DeVry Institute, Christy Trades School, and Coyne Electrical School.

While some of the textbooks listed here were not written strictly for the purpose of an in-depth study, they were written as a quick introduction review for radio repair and restoration. They were included in the list as they have merit as well. Perhaps it is a bit unfair to include them in the broad range of textbooks, but again, the purpose here was to review those currently available to the hobbyist.

One of the main characteristics of a good "radio basic principles" textbook is its ability to explain tuned circuits, resonance, detection, and amplification. A good explanation of basic circuits is also desired. Since this is at the heart of radio, it was the main criterion for judgment. Many have daunting math, which was obviously written for engineers, but I have assumed a less vigorous approach is desired. Of course, some math is required as it quantifies the discussion. However, taking more of a subjective approach made some textbooks more favorable. Also, text readability is important.

Below, the textbooks considered are listed in order of recommended preference. After the top ten, the order has little meaning, as they become about equal in quality. A critique and comments about the top candidates follows:

Starting with the best, Elements *of Radio*[1] by Marcus and Horton is highly recommended. This text had by far the best clarity of discussion and was detailed enough to explain without being too elementary. The pace is right and will keep your interest. Although the text is dated, it compared well with contemporary publications. Of course, it does not cover solid-state subjects, but this is not a disadvantage as the basic theory translates well. One can bridge to solid state with some supplemental reading. The figures, illustrations, and examples exactly illustrate the discussion. The topic organization lends itself to logical progression, making theory discussion easy to follow. The math is minimal, used only where necessary to quantify a point or explain. The best discussion of resonance, tuned circuits, and antenna theory (radiation) was found in this book. Figures and illustrations were almost always on the same page as the discussion. This may sound trivial, but trying to follow theory and discussion from figures on a different page can be frustrating. I keep this important book nearby as a reference. If you read and study no other text, read this one.

The second recommendation is the *Learn Electronics Through Troubleshooting*[2] by Lemons. Using theory and basic principles from the point of view of troubleshooting makes good sense. I found this an excellent tie to the principles and certainly an excellent supplement to *Elements.* Using two-color graphics, figures, and illustrations make the points clear and understandable. By the use of cause and effect, the discussion leads you to the basic principles. This text also includes an introductory chapter on solid-state radio.

Essentials of Radio[3] has some of the best analyses, especially of series and parallel resonance circuits. It is a comprehensive, detailed textbook covering the critical topics, but requires patience to get through it. Having over 800 pages of small print will take more than an afternoon of reading. It also has somewhat of an engineering slant, and requires careful study. Even so, the book is useful even to the casual reader as it is not all that difficult to understand.

One of my favorites is *Basic Radio Course*[4] by Frye. It is a fun read. The basics are covered using an unusual colloquial and humorous style. This is a very readable text using good analogies to explain the concepts. If you are new to radio, perhaps this would be a place to start. Frye makes study fun as well as gives outstanding illustrations to his explanations. Only minor reference to math is used. However, lacking some detail, it left me wanting more and a little unsatisfied. You may remember John Frye, as he authored the series "Carl and Jerry" for the early issues of *Popular Electronics* magazine.

Electrical Essentials of Radio[5] is less comprehensive than the other Slurzberg books. Written for the reader with limited math background who is interested in the introductory

Photo A. *For your education in the basics of amateur radio, these books are the best of the best, according to K5MLG.*

principles, this would be a good beginner's book. Written prior to *Essentials of Radio,* which made extensive use of circuits and circuit design, it provides a foundation background to further study.

Basic Radio, Principles & Technology[6] by Poole is one of the more contemporary offerings. It could be used as a supplement to bring modern circuits in alignment with the classics. I found it too brief with its discussion of resonance and tuned circuits. "Why" a circuit worked was not addressed well. A strong discussion of modern circuits and components makes it useful in understanding today's technology.

Understanding Radio's[7] approach may be too elementary for some. It uses a simplistic explanation of circuit analysis but good visualization. If you need to start with a rudimentary text, perhaps this one could be your introduction. Do not sell this book short; although dated, it has much to offer. In detailed simplistic terms the book explains how a circuit functions and why it works. The authors present some of the better explanations of resonance, crystal-controlled oscillators and microphones. Detail on "how to build a circuit" seemed to get in the way of the discussion, however.

Do not overlook the handbooks. ARRL's *The Radio Amateur's Handbook*[8] and Bill Orr's *Amateur's Handbook*[9] have excellent discussions relating to how to use the basics in circuits. I found them short on "why and how" a circuit works. Again, these are good references and probably would not make an evening's reading. But glean the basic topics for review and keep them handy for reference.

Radiotron Designer's Handbook[10] is the bible for many tube-type aficionados. It has excellent design features and explains well. It was printed in several editions and two different versions: the black volume with 352 pages and the voluminous red volume with 1498 pages. The "handbook" may be a little intimidating for some by its sheer size and its extensive use of math. But if you can stay with it and glean from specific topics, an outstanding reference for all expects of radio circuit design is yours. Perhaps more for the engineer, the handbook is comprehensive and covers more than basic radio. After all, its purpose is to be a design reference. This book seems to be in great demand as it commands a high price, used.

Another set of textbooks worthy of your study and supplemental reading come from the U.S. Department of the Navy.[11] Several reprints and editions have been made available over the years. The most recent reprint was published by Dover[12] in 1978 and continues in print. The USDPN revised the text in 1972 making it one of the more contemporary textbooks covering nearly everything from DC to light. Well-written for a beginning study.

My intent here is not to disparage any of the textbooks listed as all have much to offer and would be well worth your time to explore. Simply some would not be offered, as a "first reading" because they tended to either be tedious and unclear on points or they lost my attention in discussion. Certainly, I would encourage reading any and all texts available to you, as it will only enhance an understanding and enjoyment of radio. Whether you are a beginner, an old-timer, or an engineer and want to maximize your radio experience, I recommend starting with these top textbooks.

Try to acquire the top reviewed books. Your radio library should not be without them. Most all those in this article were acquired in the past five years and my personal survey indicates most are still available. Your local radio organizations, auctions, the Internet, the library, or your local swap meet would be good sources to explore. Try [http://www.bookfinders.com] or [http://www.eBay.com]. Keep on the lookout for a basic radio textbook when you visit a hamfest or radio trade day. If an opportunity occurs to pick up any interesting radio textbook, I would encourage you to take advantage and add it to your library. Many turn up at bargain prices. Read and learn from the masters.

If there have been some obvious candidates excluded or your favorite is not on the list, please let me know. I would like to hear from you. My hope is that you will derive some pleasure from reading and studying a good textbook and get excited about this wonderful phenomenon known as RADIO!

References

1. *Elements of Radio* (second edition) by Marcus and Horton; Prentice-Hall, 1950.

2. *Learn Electronics Through Troubleshooting* by Lemons; Howard Sams, 1971; ISBN 0-672-20651-X.

3. *Essentials of Radio* by Slurzberg and Osterheld; McGraw-Hill, 1948.

4. *Basic Radio Course* by John T. Frye; Tab Books, 1961; ISBN 0-8306-1104-5.

5. *Electrical Essentials of Radio* by Slurzberg and Osterheld; McGraw-Hill, 1944.

6. *Basic Radio, Principles & Technology* by Poole; Newnes, 1999; ISBN 0-7506-2632-1.

7. *Understanding Radio* By Watson, et al.; McGraw-Hill, 1940.

8. *Radio Handbook* (twenty-second edition) by William Orr; Howard W. Sams & Co., Inc.; 1981; ISBN 0-672-21874-7.

9. *The Radio Amateur's Handbook* (annual editions, 1940s to date), ARRL.

10. *Radiotron Designer's Handbook* edited by Smith; third and fourth editions (black and red editions), Wireless Press, RCA, 1945, 1953.

11. *Elements of Electricity and Radio,* U.S. Navy course, 1944; reprint by Antique Electronic Supply, 1999.

12. *Basic Electronics (Vol. 1)* by Bureau of Naval Personnel; U.S. Government Printing Office; Cat. # D 208.11: EL2/10/971/V.1; revised 1972. Also published as reprint by Dover Publications, NY; 1977; ISBN 0-486-21076-6.

13. *Grob Basic Electronics* (seventh edition) by Bernard Grob; Macmillan/McGraw-Hill, 1992; ISBN 0-02-800762-X

14. *Radio Physics Course* by A. A. Ghirardi; Murray Hill Books, Inc., 1942.

15. *Basic Radio* by Hoag; D. Van-Nostrand, 1943.

16. *Modern Radio Essentials* by

Continued on page 54

CALENDAR EVENTS

Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the November issue, we should receive it by August 31. Provide a clear, concise summary of the essential details about your Calendar Event.

SEP 6

SPENCER, IN The Owen County Amateur Radio Assn. and the Bloomington ARC will co-sponsor the Owen County Amateur Radio Hamfest on September 6th, 2003. For more info contact *Katie Smith K9INU* at *812-829-2140;* or *Carl Zager* at *812-339-4437.*

SEP 12, 13

BENTONVILLE, AR The B.C.R.O. Hamfest will be held at Thomas Jefferson School, 810 Bella Vista Rd., Bentonville AR, Saturday 8 a.m. to 1 p.m. Setup is Friday night at 6 p.m. VE exams at 10 a.m. Saturday. Talk-in on 145.290 down 600. Admission $3. Tables $5. Tickets are two for $5. Food and drinks available. Contact *Betty Weiberg at 417-435-2332* or by E-mail at *[jweiberg@leru.net];* call *Shirley Harris* at *479-451-8626;* E-mail *[saharris@centurytel.net];* or *Buster Morrow* at *479-631-9231.* E-mail *[ad5am@mc2k.com].*

SEP 13

GRAND RAPIDS, MI The Grand Rapids ARA will present "GRA Hamfest 2003" at the Forest Hills Northern High School, 3801 Leonard St. NE in Grand Rapids, 8 a.m. until it's over. Directions: Hwy. I-96 exit #38 / Hwy. M-44, north 1 mile to Leonard St., turn right (east). This is a fleamarket/ swap meet featuring electronics, ham radio, CB, shortwave equipment and computer equipment. VE exams at 10 a.m. Contact *Ed Novakowski N8UXN* by E-mail at *[hamfest@w8dc.org],* or evenings call *616-458-9029.* Check the Web page at *[http://www.w8dc.org/swap.htm].* Talk-in on 147.26(+) 94.8 Hz and 146.52 simplex. ARRL-sanctioned.

SYRACUSE, NY The Radio Amateurs of Greater Syracuse (RAGS) presents its 48th annual Hamfest from 8 a.m. to 2 p.m. at the Pompey Hills Fire Department, Saturday, September 13th, rain or shine. Take I-81 exit #15 on to Route 20 East. Go 6 miles to Henneberry Rd. on the left. Forums, prizes, ARRL. VE walk-in exams at noon. Admission $5 or 16 years and under free. Buy and sell ham radio, computer equipment, and more. Rent an indoor flea market space with an 8 foot table for $12, or bring your own table for only $5. Breakfast starts at 7 a.m. Lunch will be served later. This location is 1400 feet above average terrain so bring your mobile rig and work some DX. Talk-in on 147.90/.30 MHz. Telephone *315-698-4558,* or write to *RAGS Hamfest, Box 88, Liverpool NY 13088.* E-mail through *[ragsinreview.com].*

SEP 14

NEWTOWN, CT The Candlewood ARA of Danbury CT will hold their Western CT Hamfest on Sunday, September 14th, at Edmond Town Hall. Directions: Rte. 6. Exit 10 off I-84. Follow the signs. Talk-in on 147.300(+) PL 100. New equipment dealers, flea market, tailgating, electronics, computers, refreshments. Tables $12.50 each (includes 1 admission). Tailgating $8 (includes 1 admission). Admission $5, children under 12-years-old admitted free. For reservations and info, contact *John M. Ahle W1JMA, 120 Fire Hill Rd., Ridgefield CT 06877.* Call *203-438-6782;* or E-mail to *[W1JMA@arrl.net].*

SOUTH DARTMOUTH, MA The Southeastern Massachusetts ARA, Inc. will hold its annual flea market on the club's grounds at 54 Donald Street in South Dartmouth. The event will run from 7 a.m. to 12 noon, rain or shine. Talk-in on 147.00/.60. Admission $2 (spouse and children free). Walk-in VE exams at 10 a.m. Free space and admission for vendors. For more info go to *[www.semara.org],* or contact *Tim Smith N1TI* at *508-758-3680.* E-mail to *[rt_smith@yahoo.com].*

SEP 20

ROLLING MEADOWS, IL The 51st Annual W9DXCC Convention and Banquet will be held Saturday, September 20th at the Holiday Inn (near O'Hare Airport) in Rolling Meadows IL. Come early. There will be a Friday Welcome Reception hosted by Carl Smith N4AA and DX Publications, followed by a Hospitality Suite late Friday. This will be hosted by the Northern Illinois DX Assn. Stay late on Saturday night and enjoy the Saturday Night Hospitality Suite hosted by the Greater Milwaukee DX Assn. Other features will include presentations by major DXpeditions, an ARRL forum, Grand Banquet and prizes, and DXCC QSL card checking. The Master of Ceremonies will be Jim O'Connell W9WU. For more info contact *Bill Smith W9VA* by calling *847-945-1564;* or E-mail to *[w9va@aol.com].*

SEP 25–28

SEATTLE WA Microwave Update 2003 organizers and the Pacific Northwest VHF Society are joining forces to host a joint conference in the Seattle WA area on September 25–28, 2003. Registrations for the joint conference will be accepted beginning April 1st. Cost of the registration will be $40 prior to September 12th, and covers all three days. Single day or single event registrations are not available. Late registrations, including at the door, will be $50. Registration forms can be downloaded at *[www.microwaveupdate.org]* or send an SASE to *John Price N7MWV, 12026 81st Ave. NE, Kirkland WA 98034,* and a form will be mailed to you. Completed registration forms and payment should be sent to the same address. Make checks payable to *Microwave Update 2003.* Joint conference sessions and the Saturday evening banquet will be held at the Everett Holiday Inn and Conference Center, a short drive north of downtown Seattle. Special rates have been arranged with the hotel for conference participants. Rooms are $69 per night plus tax, a real bargain for the Seattle area! It is suggested that early reservations be made directly with the hotel at *425-337-2900.* Be sure to mention "Microwave Update" to get this rate. Reservations must be made by August 21st for this rate.

"White papers" are currently being solicited from potential authors and speakers for publication in the 2003 conference proceedings. Topics specifically of interest to Microwave Update attendees, as well as those on VHF and UHF subjects usually associated with the annual Pacific Northwest VHF Conference are being solicited. Papers will be accepted until July 1st, 2003, to allow enough time for printing. White papers should be sent directly to *Jim Christiansen K7ND,* via E-mail at *[k7nd@att.net].* MS Word format is preferred. Microwave Update 2003 and the Pacific Northwest VHF Society respectively, will be the sole judges of whether presentation requests and white papers are accepted.

If you are interested in making a session presentation at one of the Microwave Update 2003 sessions, please respond to *NU7Z [nu7z@aol.com].* For presentations at the Pacific Northwest VHF Conference sessions, contact *N7CFO* at *[n7cfo@ix.netcom.com].* LCD projection equipment will be available for those using PowerPoint presentations. Slides and video presentations can be accommodated with advance notice.

OCT 5

MEDINA, OH Join the M2M Medina Amateur Radio group at the Medina County Career Center, 1101 W. Liberty St. (State Route 18) from 8 a.m. to 2 p.m. to have fun at the Medina Hamfest. The Grand Prize being offered is a mobile rig and antenna setup. Also featured will be a 50/50 raffle, VE exams, ladies' door prizes, computer equipment and new and used ham gear. All indoor tables and spaces. For general questions about the hamfest, call *Mike N8TZY* at *330-273-1519* after 7 p.m., or E-mail *[n8tzy@m3net.net].* For VE exam info call *Fred K8FH* at *440-236-3477.* Walk-ins are always welcome. Testing starts at 9 a.m. Hurry in and don't be late. Inside vendors tables are $9 each in advance or $11 each after Sept. 29th. Inside flea market spaces are $7 each in advance or $9 each after Sept. 29th. Send your remittance to the *Medina Hamfest Committee, P.O. Box 452, Medina OH 44258.* Remember to enclose an SASE for return of tickets. Advance reservations must be received by 09/29/03. All tables will be held until 9 a.m. on the day of the show. If you have any special requests, please let us know and we will try our best to help.

QUEENS, NY The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot, Flushing Meadow Corona Park, 47-01 111th St., Queens NY. Doors open for vendors to set up at 7:30 a.m. Buyers admitted at 9 a.m. Free parking, door prizes, food and refreshments. VE exams at 10 a.m. Admission by donation, buyers $5, sellers $10 per space. Talk-in on 444.200 rptr, PL 136.5; 146.52 simplex. Web site [*www.qsl.net/hosarc].* For further info, call at night only, *Stephen Greenbaum WB2KDG 718-898-5599,* E-mail *[WB2KDG@arrl.net];* or for VE exam info, call *Lenny Menna W2LJM* at *718-323-3464,* E-mail *[LMenna6568@aol.com].*

OCT 12

WALLINGFORD, CT The Meriden ARC, Inc. will hold the 11th Annual Nutmeg Hamfest and Computer Show, featuring the 2003 American Radio Relay League State Convention, on Sunday, October 12th, 9 a.m. to 3 p.m., rain or shine, at Mountainside Special Event Facility, High Hill Rd., Wallingford CT. Exit 15 Rte. 91 (North or South). Follow signs. Info is available on the Web site at *[www.qsl.net/nutmeghamfest];* or we can be contacted by E-mail at *[nutmeghamfest@qsl.net].* General admission is $7. Children under 12 are admitted free and must be accompanied by an adult at all times. Proceeds from the event will help support public service, scholarship and civic activities. Indoor booth space with 8 ft. table and chair is $30. Outside space $20. If you pay in full before Sept. 12th, deduct $5. Make payments to *Nutmeg Hamfest* and mail to *Andy Purchia N1XXU, 116 Kensington Ave., Meriden CT 06451.* Phone *203-235-8440.* Talk-in on 147.36. Major vendors will be present, including KJI Electronics, Lentini Communications and Battery Tech. For VE exam info call *Joel Corneal N1JEO, 203-235-6932.*

OCT 25

RICKREALL, OR The Mid-Valley ARES is proud to present its 9th Annual "SWAP-TOBERFEST" Amateur Radio Emergency Services Convention. The convention will be held on Saturday, October 25th at the Polk County Fairgrounds in Rickreall OR, west of Salem where Highway 22 meets 9W. Doors will be open for the convention from 9 a.m. to 3 p.m. the day of the event. Swap table setup will be from 6 to 8 p.m. Friday night, October 24th, and on Saturday morning, October 25th, at 7 a.m. Self contained RV spaces are available for camping at $12 per night. Talk-in on the 146.86 rptr. (186.2 PL). Features include swap tables, commercial dealers, meetings and seminars. Additionally, emergency communications vehicles will be on display from Marion and Polk County Emergency Management, Civil Air Patrol, American Red Cross, and others as available. For more info contact *Shane Kuehl WØSPK, 503-589-0496,* or E-mail to *[w0spk@arrl.net].* To print a copy of the flyer and pre-registration form, the URL is *[http://home.earthlink.net/~kd7bcv/Swaptoberfest2003/Swaptoberfest_2003.html].* Tickets are $5 each in advance or $7 at the door. No-power swap tables are $18 (includes one registration). Additional no-power swap tables are $13 each. Tables with power are $20 each (includes one registration), additional power swap tables are $15 each. Pre-registration tickets can be picked up at the front door at 7 a.m. Saturday morning. If you require written confirmation of your pre-registration, or your tickets by return mail, please include a self-addressed stamped envelope and mail to: *Mid-Valley ARES, P.O. Box 13848, Salem OR 97309.* Make checks or money orders payable to *Mid-Valley ARES.* Only 2 pre-registered participants will be allowed per table during setup. All participants must register (unless 12 or under in age). Disabled hams who have pre-registered may enter SwapToberfest at 8:30 a.m. through the East door. One pre-registered assistant, to offer a helping hand, is allowed per disabled ham. Drawing rules: You need not be present to win the Early Bird (ICOM IC-Q7A Dual-band Handheld; or Grand Prize (ICOM IC-T90A Dual-band handheld); you MUST be present to win the hourly drawings; no purchase necessary; limit one entry per person. The Amateur Radio Emergency Services Convention is being sponsored by members of the Polk County ARES (W7PLK) — Emergency Coordinator, Bud Smith N7BUD; and the Oregon Emergency Management ARES/RACES Unit (W7OEM) — Emergency Coordinator, Shane Kuehl WØSPK.

OCT 26

CANTON, OH The Massillon ARC will hold their Hamfest Sunday, October 26th, 8 a.m. to 3 p.m. at Stark County Fair Grounds, 305 Wertz Ave. NW. From I-77 take downtown exit, turn left (west) on W Tusc. Turn right on Wertz to fairgrounds. From I-77 S, take the 4th St. NW exit, turn right (west) into grounds. Setup is at 6 a.m. Admission is $5. 8 foot tables with electric, $12. Handicap accessible. Free parking. Talk-in on 247.18(+). For tables, contact *Terry Russ N8ATZ, 3420 Briardale Cr. NW, Massillon OH 44646.* Visit *[www.marcrado.org].*

SPECIAL EVENTS, ETC.

SEP 27

RAYMOND, ME The U.S. Coast Guard Auxiliary D1NR Radio Raymond, K1G. 1300Z–2100Z Sep. 27th. 64th USCG Auxiliary, 25th Canadian CG Auxiliary anniversaries and ISAR Special Event Radio Day (VO1RAC). 28.320, 21.310, 14.260, 7.260. CGA Certificate. Contact *Keith C. Morton W1NDH, P.O. Box 809, Raymond ME 04071-0809.* 73

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Hide a Transmitter, Pay a Fine?

"Let's have a picnic! We'll E-mail all our family members and some of our friends to meet us at Podunk Park next Saturday. Bring your softball bat and glove, we'll have a 3-legged race, and I'll have some direction finding gear to demonstrate foxhunting."

That sounds like fun, doesn't it? But in Orange County, CA, this might be the start of an illegal act. Some officials apparently think so, with or without the foxhunting demo. I discovered this the hard way a few days ago, and right now I'm worried that it may be true in many other places. You'll want to know why, and I'll tell you shortly, but first a bit of background.

For several years, "Homing In" has encouraged readers to get their clubs into on-foot transmitter hunting (also called foxhunting, fox-tailing, radio-orienteering and ARDF). Practice sessions in local parks are an ideal way to start. I have been putting on such sessions informally several times a year here in southern California, in addition to more formal events at hamfests and conventions. We've been in 12 different parks so far.

Unlucky 13th

As in many other places around the country, local fox-tailers are in training for the Third USA ARDF Championships[1] as I write. Last week, I scouted out an Orange County park that we've never used for radio-orienteering before. It seemed ideal for a championship training session because there are about six miles of trails around a

***Photo A.** Tim Van Nes N9EL won the first Daytona ARDF event using a steel-tape yagi for two-meter foxhunting. Plans for this antenna are on the Web. (All photos by John Munsey KB3GK)*

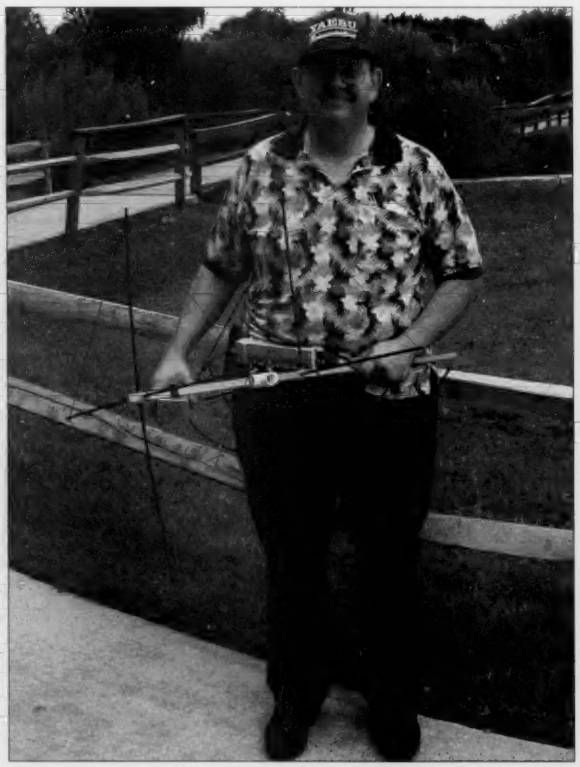

***Photo B.** It looks like John Greiff N4UJU used a shortened version of his mobile two-meter quad for this on-foot foxhunt. He found all the foxes and took second place.*

reservoir and canyon. However, much of the off-trail area is off-limits because it's a wildlife refuge. I knew that the ranger might be concerned about potential damage to this environment, so I sought him out.

At first, the ranger was cool to the idea of a dozen hams running the trails and looking for green ammunition boxes with transmitters in them. But after a while, we came to an agreement. I promised to instruct the hunters to stay on the trails and not look for foxes beyond a few feet away. He agreed that we could do the event and we exchanged contact information. I went home to put out an E-mailing and to promote the event on local repeaters.

Two days later, I got E-mail from the ranger. "I called the county permit office to clarify the regulations concerning permits," he wrote. "My contact said that since you are doing an activity and not merely sitting under a tree talking, a permit is needed to protect the county's liability interests."

"It's not hard," he told me when I immediately phoned him in disbelief. "You should have applied 20 business days before the event, but now you can fill out the form I attached, take it to the county seat during business hours, pay the $56 filing fee, and show evidence of insurance indemnifying the county." He made it clear that he was withdrawing his approval of our session until I got clearance from that office.

Confident that I could convince the permit purveyors that an informal ARDF practice session would be "under their radar" just as a 3-legged race at a family picnic would be, I called the permit clerk supervisor per the ranger's directions. No such luck. In her eyes, this was a "competitive" event, thus requiring a permit. She agreed that rangers don't usually boot families out of parks for having 3-legged races and softball games, but she wouldn't budge on the need for a permit for ARDF. After several minutes of back-and-forth, she kicked the matter up to the county's manager of harbors, beaches, and parks.

"How do you win at radio-orienteering?" the manager asked after I gave him a brief explanation of what we'd be doing. I replied that the winner finds the most transmitters in the least time. "So they run?" he asked, and I replied, "About a third will be running and the rest will be walking or trotting."

"Then it's a race," he declared, "and any race in a park requires a permit, period." I hadn't seen any such mandate on the application form. On the other hand, this form gave the staff lots of latitude. It stated that "County Property Permits will coordinate review of your application package and advise you of additional fees, surety deposit, and other items required for permit issuance." Good grief, there might even be more surprises lurking!

Taking on the bureaucracy

I decided to press the issue and asked to see the relevant written regulations for permits and fees. The parks manager agreed to send them to me, and within an hour, my fax machine ground out four pages of fine print and tables, obviously part of a much larger document. Yes, there was a fee schedule that included "5k and 10k runs," along with over two dozen other activities such as weddings, dog shows, dunk tanks, and pony rides. But there was no definition of what constitutes a run, and no mention that any competition requires a permit. If a

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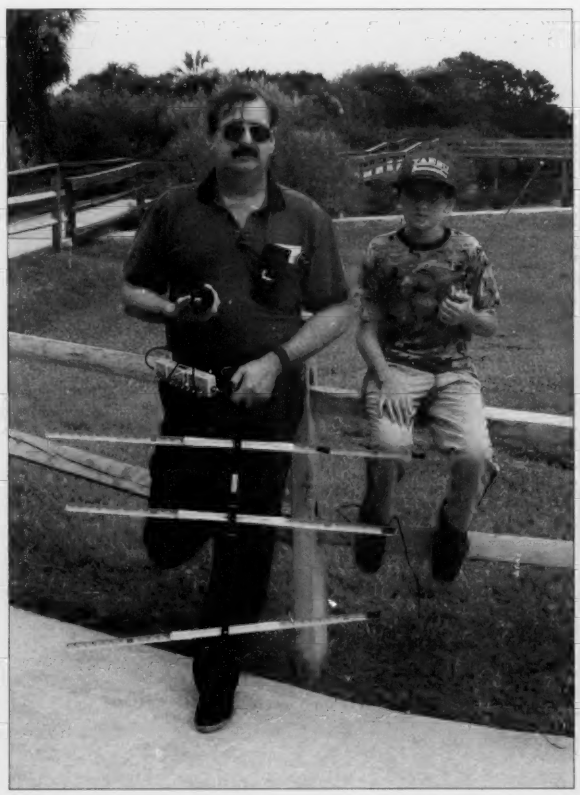

Photo C. *Art Byrnes KA4WDK and his son A.J. found two foxes in about an hour and 15 minutes.*

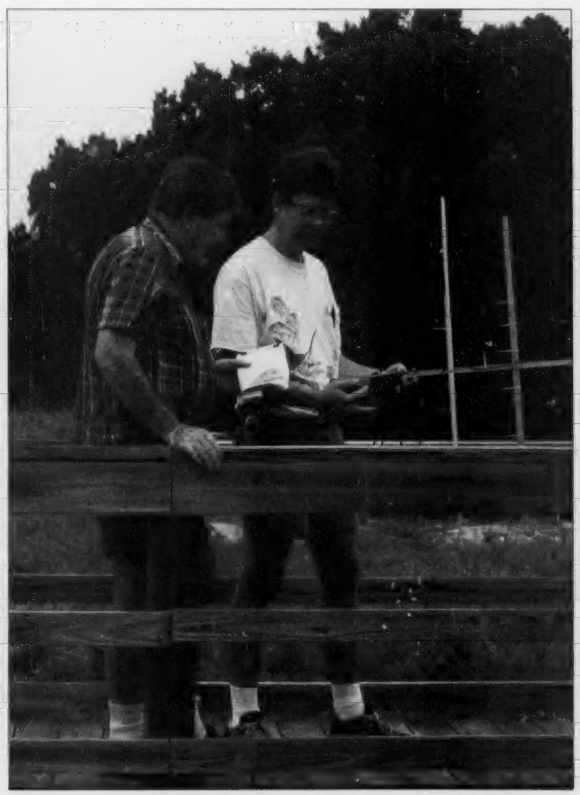

Photo D. *Fred Villers K8FV and Steve Wyatt KO4YX teamed up to bag a couple of radio foxes.*

Homing In

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couple of joggers decide to see who is fastest, do they need to file an application first?

The only paragraphs in the rules that indicated a threshold for requiring a permit were in the fee schedule, where the category of permit he circled as being applicable to me would be "using property for exclusive, personal, noncommercial use." The other two categories were for exclusive commercial or nonprofit use, with and without admission charge. In all three categories, the word "exclusive" was included.

Aha, that's it! The next day, I E-mailed the parks manager, the permit clerk supervisor, and the ranger. I pointed out that county regulations clearly state that permits are required only when a citizen or group wants exclusive use of a park or an area of a park, meaning to the exclusion of others. Certainly a permit would be necessary if an area of the park were to be cordoned off, or if streets or trails were to be blocked for exclusive use of the participants in a race. But for our radio-orienteering, there will be no exclusive use of the trails. We will not be blocking off anything. In other words, we will be mixing in and not taking over.

With that as evidence, my E-mail restated my belief that I would not be violating any county rules/regulations by holding this practice session without a permit. I declared my intent to proceed unless I received a letter of prohibition explaining clearly why it would be unlawful for me to do so.

Did it work? Actually, I don't know yet. The event is still a few days away and I haven't received a definitive ruling. I'm hoping that I'll get an OK and the session will go on as planned, because civil disobedience is out of the question. If the ranger tells me in advance that he'll enforce a bureaucrat's prohibition, I'll cancel. Then my next call will be to my elected county supervisor's office. I want him to tell me if the permit office exceeded its authority by its broad interpretation of the meaning of "exclusive," or if that interpretation actually represents the wishes of the Board of Supervisors

You may be wondering, "Why not just get the permit?" Indeed there have been occasions where I have done so, such as foxhunting events at ARRL conventions and the West Coast VHF/UHF Conference when we needed to reserve a section of a park for a big group and the sponsor had insurance. But if the law doesn't require it, there is no good reason to pay a fee and take out insurance every month or two so a dozen hams can informally run the trails in a park, mixing in with lots of joggers who are running the same trails at no charge.

If I were to find a way to demonstrate insurance and take out the permit now, I would be setting a precedent for any time that someone wants to do some ARDF in an Orange County park, no matter how informally. I'll tell you the outcome of this tussle in a future column. If you want to know sooner, check the "Homing In" Web site to see if there are results of radio-orienteering at Peters Canyon Park on July 19, 2003.

***Photo E.** Pat Eckenrode AC4QM had a bad day with equipment failure plus an encounter with a snake. Don't worry, it will be better next time!*

Watch for the snakes!

Lots of other individuals and clubs are training for the USA Championships and promoting radiosports as I write. John Munsey KB3GK, a frequent contributor to "Homing In," sent a CD of photos from the first international-rules on-foot foxhunt in Daytona Beach, FL, held on June 21, 2003.

"The park is 200 acres of woodland, water, swamp and scrub growth," he wrote. "Much of it cannot be penetrated by humans, not even transmitter hunters. There are various trails throughout the area, but none of the foxes were on or very near a trail. This area is populated by Florida wildlife, including alligators, snakes, lizards, and ticks, with swamp and open water. Every hunter was offered bug spray and bottled water before the hunt."

KB3GK put on the hunt, along with Bill Thomas KE4HIX. "Five transmitters were planned, but #2 arrived with a dead battery," he reported. "Then #4 failed to turn on remotely. When Bill went out to turn it on manually, he was spotted by one of the hunters.

To be fair, that fox was pulled out also. The loss of two did not prove to be a problem, as the remaining three provided plenty of challenge.

"Everyone agreed it was a really tough landscape to cover," John continued. "Daytona hunters are among the best at mobile hunting, but long-distance on-foot hunting is new and the learning curve was steeper than some expected. Several had recently built their equipment and as expected, there were small bugs to be worked out.

"One hunter discovered that his handie-talkie had a bad BNC connector so he decided to use a scanner with an active attenuator for hunting. But the scanner did not perform well and could not hear most of the transmitters. Others had minor problems such as needing a short length of coax, an adapter, or attenuator to complete the setup.

"For the past two weeks there had been rain every day, sometimes up to an inch. The predicted odds of rain for the hunt date were 70%, but dry weather held until just after the cookout that followed the hunt. Then about three-fourths of an inch fell in the next hour as hunters drove home.

"There was only one close call with wildlife. Pat Eckenrode AC4QM reported that he almost stepped on a snake of about four inches diameter. Pat reported that he did not stay long enough to determine other details. Other hunters who saw Pat leaving that

Continued on page 54

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Why Operate Portable?

In today's world everything is getting more portable. The room-size computer has given way to the desktop, to the laptop, to the PDA. As a mobile society we want to take everything with us, and radios are no exception.

Not only does it seem like everyone has a cell phone, but it also seems like everyone is constantly using theirs. In some ways it could be argued that amateur radio operators have gone from the forefront of the world of electronics to somewhere behind the leaders. While this might hurt our collective pride, it is not totally unexpected. Any group tends to make progress, hit a plateau, and then start to progress again.

I think one of the reasons that we haven't seen a lot of growth in the field of portable and mobile communications is because we've been focusing on the digital communications world. After learning to crawl with RTTY, we began to walk with packet radio, which gave way to APRS, PSK31, and most recently the marriage of radio and the Internet with IRLP. Developing these modes required a lot of time in the shack hunched over the keyboard. Although I like digital modes, I do like to see continued growth in mobile and portable communications, especially with regard to how they could be useful in an emergency. Let's take a look at some of the changes that have impacted nonfixed communications in the past.

Only a few years ago a ham had to post a copy of his license in a clearly visible location at the station. The station license with its call letters was assigned to the station and the operator license was assigned to the amateur radio operator. This was based on the fact that when ham radio started, a station was a fixed entity, normally large and bulky. There were exceptions, of course, such as stations on ships. The stations were equally large but they were mobile even if they did require that a structure be built on the deck of the ship to house the radio station.

For many years the requirements of a ham radio operator continued to reflect the fixed station. The law required that the operator maintain a log of all operations. Hams were required to sign their call letters followed by "mobile" or "portable" to designate when operating away from their home location. Callsigns reflected the region in which your station existed and if you moved your callsign was changed to reflect your new region. When operating portable or mobile you were required to indicate the region from which you were operating, such as "KE8YN Mobile 7."

A lot has changed over the past 20 to 30 years as ham radio has gone from a primarily fixed service to a more mobile one. I suspect that if you counted up all the radios in use today, handheld and mobile radios would far outnumber the traditional fixed stations. I use 8 radios on a regular basis. At the house I have an HF rig, a dual-band 2-meter 440 MHz rig, and another 2-meter running APRS. In the car I have HF and a dual-band 2-meter/440 MHz, and I have three handie-talkies that get used regularly. I, like everyone else, tend to gravitate toward the nonfixed equipment for much of my operating opportunities.

The phenomenon has several key pieces. Today people are far more mobile than they were 30 years ago, whether they want to be or not. We tend to move from place to place for career or family reasons on a regular basis. Whereas once people went to work for a company and continued with that employer for their entire career, today people change employers 6 to 10 times during a career and may even change career fields several times. Commutes are longer, so we spend more time in our cars, and air travel is a regular part of many career fields. Naturally there are more opportunities to enjoy our hobby on the road or out of the ham shack than ever before.

In any case, as we've gotten more mobile, the regulations governing our operating practices have been loosened. Like the chicken and the egg, it's not important as to which one came first. Although I tend to concentrate on how mobile or portable operations can contribute to support for emergencies or disaster situations, let's take a look at some of the ways that nonfixed operations can just be fun.

Sometimes we think in terms of a fairly exotic setup for mobile or portable operations, but it is not necessary to cash in your 401(k) to embark upon a nonfixed operation. Over the past few columns I've written about setting up a mobile station, using an Alinco DX-70T and ATOC Iron Horse antennas. For the next few months I'm going to look at portable operations with an eye to the business traveler or vacationer.

In an ideal world, a portable rig would be small enough to fit in a corner of your suitcase, including power supply and antenna. It would be powerful enough for DX operations but won't interfere with a television hooked to a poor cable connection — so it would be useful in a hotel room. It would run your favorite mode on your favorite band and the antenna would be minuscule. This is exactly why VHF and UHF are so popular. A handie-talkie fits, voice is a mode almost all hams like to use, power requirements are low, and the antenna is short. Likewise, with most of the country enjoying good repeater coverage, band conditions are not an issue and a traveling ham can expect to be able to hit a repeater from almost anywhere.

Unfortunately, 2 meters and above have become so commonplace that a lot of the excitement and enjoyment has dropped out. Local hams don't monitor the repeater as often and travelers may leave the HT in the

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AOR Introduces Digital HF Format

AOR USA has introduced the ARD9800, a digital modem unit that could bring a "universal" digital voice format to the HF bands. AOR developed the product and format over the past few years, in an effort to bring the advantages of digital voice and communications to the HF bands.

"The ARD9800 represents both a great advance in communications and an opportunity for Amateur Radio operators to enjoy the advantages of digital communications no matter what brand of radio they may own," said Takashi "Taka" Nakayama KW6I, Executive Vice President of AOR USA. "The advantages offered by the ARD9800 are many, including 'near FM'–quality audio and the likelihood that the digital format can operate at lower signal levels than those of analog SSB, which is important as we approach the solar minimum."

The ARD9800 is a small, modem-size unit that requires only two connections to an existing transceiver, one through the radio's microphone input port, the other from the rig's "speaker out" jack to the ARD9800's audio input port. No modifications to the radio are necessary and the full analog capabilities of the transceiver are maintained. The owner may use the microphone provided with the ARD9800 or wire his mic to work through the ARD9800.

"The ARD9800 was demonstrated at the recent Dayton Hamvention and again at the large Amateur Radio convention in Friedrichshafen, Germany, and enthusiasm for the product was very strong," said Mr. Nakayama. "The most asked question was, 'When will it be available?'" Hams at both gatherings were amazed at the audio quality, often saying they had no idea such audio quality was possible using SSB on the HF bands.

The ARD9800 uses the open G4GUO digital protocol, a complex digital format that incorporates elements of phase shifting to transmit the digital signal. The digital tones have been engineered to fit within the normal voice audio passband, making it possible to use unmodified, existing radios for the digital format. The format uses forward error correction (FEC), making unlinked communications possible with two or more participants. "A brief header is sent at the beginning of each transmission, followed by the digital data," explained Mr. Nakayama.

Operators with ARD9800 units will not have to place their units in the digital mode to receive digital signals. The unit will automatically detect the digital format, decode it, and pass it to the self-contained speaker or to an external speaker. "This allows operators to listen for both conventional analog signals, as well as for digital," explained Mr. Nakayama. "It lets operators take advantage of the best of both worlds." To transmit in digital mode, the operator simply moves a switch on the ARD9800 front panel. Setting the switch back in the analog mode allows "normal" use of the transceiver.

The ARD9800 is easy to install and operate. No complex connections or adjustments are required. The owner simply solders a connector to a mic input cable that matches the mic inputs for his particular brand of radio. The ARD9800 is then connected to the mic input, the speaker output and to a 12 VDC power source.

AOR engineers designed some allowance for frequency error on the HF bands so that the operator does not have to be "exactly on frequency." The ARD9800 will tolerate plus or minus 125 Hz in Digital/SSB communications mode.

The ARD9800 can also be used in other modes, such as AM or FM. Users of those formats will also notice improved audio quality; however, AOR cautions against using the digital format in mobile FM operations, as the vehicle's motion could cause "picket fencing" that may result in the loss of data and a dropout of the digital signal. Also, some repeaters may not key up quickly enough to allow the passing of the digital "header" needed to establish the decoding of the digital signal. Mr. Nakayama points out that the best advantages of the ARD9800 become apparent on HF in the SSB mode: "The audio is amazingly clear."

In addition to voice communications, with an optional memory board, the ARD9800 can also be used to transfer still images and even computer files. The ARD9800 has composite video input and output ports; it sends an image similar in speed to SSTV, but many believe the image is of a higher quality than conventional SSTV. The composite video ports allow the use of many common devices such as video and digital cameras along with conventional NTSC monitors and storage devices, such as VCRs or DVD recorders.

The unit also has a computer connection port, along with a provided serial connection cable, to allow controlling parameters of the ARD9800 and to facilitate the transfer of files over the air, if desired.

Included with the ARD9800 is the modem unit, a microphone, power cable for connection to 12 VDC, computer connection cable, and a conventional 8-pin round mic input connector. (Note that the ARD9800 does NOT need to be connected to a computer in order to operate.)

Options include a power cube, the memory expansion board, and custom-made cables that fit the microphone input ports of a variety of popular transceivers.

"We are often asked if digital HF communications are legal," said Mr. Nakayama. "The ARD9800 uses an open, published protocol (G4GUO), in conformity with FCC rules. In that way, it is no different from several other digital modes already in use, such as RTTY, AMTOR, etc."

Along those same lines, the ARD9800 has no provision for encryption of its data. (In the near future, AOR will introduce a commercial version of the unit for use by authorized commercial entities on their respective bands, that may support encryption.)

Mr. Nakayama added, "The big advantages we see in the ARD9800 are that it can be used right away, provides superb audio, works with every transceiver, is not a format that users of only one brand of radio can use, and adds great capabilities to operators, while it takes nothing away from what they already have. We think we've achieved a win-win product that could be as exciting a development today as SSB was nearly 50 years ago. AOR is very proud to present this product to Amateur Radio operators around the world."

AOR is a manufacturer of high-quality receivers, reception antennas, lab equipment and station accessories, headquartered in Tokyo, Japan, with North American distribution headquarters in Torrance, California. The MSRP for the ARD9800 is $549 USD. Dealers are free to set their own prices and often discount from the MSRP.

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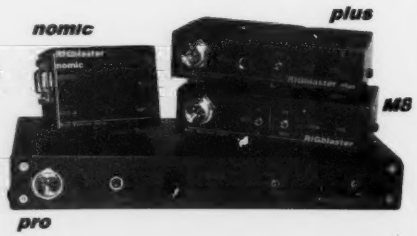

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ON THE GO

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briefcase. If there are stormy conditions and the local television announces a watch or a warning, most of us quickly grab the HT and the repeater directory to see what SkyWarn is tracking. However, there's a lot less general chatting than there once was.

Ten meters can be worked with a small rig and a relatively short antenna. There is a lot of voice activity on both upper sideband and FM. Like VHF and UHF there are many repeaters, and these open operations up on a worldwide basis. It's always fun to hit a repeater and hear a DX station into the same repeater. While ten meters is good for operating during daylight hours, it is pretty muted after sunset. Twenty meters offers some opportunities throughout the day and into the evening, but you have to compete with the "big guns" and the antenna becomes significantly longer.

There are several interesting rigs that offer multiple bands and multiple modes, but that can be operated easily as a portable. They were designed from the ground up to be a portable rig with carrying cases and whip antennas. These are a premium solution to the question of portable operations but might not be affordable for all hams.

Finally, there is one answer that may represent a good option and is based upon our earliest days as a hobby. Long ago, when ham radio was new, Morse code was a popular choice because it was a mode that was affordable and practical. The average ham could construct a working transceiver within his or her budget and get on the air. He or she could work the world with such a modest system. Although most of us prefer to use a microphone or a keyboard for much of our ham radio adventures, CW still presents some opportunities for portable operations. The rigs have migrated from a tuna tin to the metal Altoids box, but such rigs are small and inexpensive, and can be run from a battery or a "wall wart" transformer. While I'm not a die-hard CW fan, it is one

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Andrew C. MacAllister W5ACM
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Houston TX 77083-5640

Field Day 2003

Field Day is one of the most popular on-the-air contests/activities in amateur radio. It is held each year on the fourth weekend in June. The event is sponsored by the American Radio Relay League (ARRL) as an emergency preparedness exercise. During the 24-hour period, U.S. and Canadian participants strive to make as many contacts as possible operating in remote locations from tents, campers, vehicles, or just a simple setup in the middle of a field.

The ARRL Field Day rules consider the amateur satellites as a separate band and provide a 100-point bonus for the first satellite contact. The Radio Amateur Satellite Corporation (AMSAT) version of the event considers each satellite as a separate band, encourages international participation, and has additional rules for digital communications. Many Field Day groups have made efforts to put more emphasis on their satellite stations, both for ARRL points and to simultaneously make contacts in the AMSAT competition.

Field Day 2003 via satellite

Field Day via satellite in 2003 was excellent, and more "civilized" than some previous years. The recent loss of several satellites, including RS-12/13 to a solar flare last summer, Fuji-OSCAR-20 (FO-20) to a low-voltage controller during nighttime passes, and UO-22 to an unknown age-related degradation, left some large holes in the normal around-the-clock coverage of amateur satellites. The only amateur satellite usable in the middle of the night in North America was FO-29. Stations around the world (AMSAT Field Day Rules — [http://www.amsat.org]) vied for voice, CW, and digital contacts using the current amateur-radio satellites.

Jerry K5OE and Ron AG5RS went for a modest operation on the far-west side of Houston, focusing on AMSAT-OSCAR-40 operation using the L-band (23 cm) uplink and S-band (13 cm) downlink. The American Radio Relay League (ARRL) classification for their activity was 1B, for a single transmitter and no more than two operators. They used Jerry's call, K5OE. I was in West Point NY, attending a wedding, and listening wistfully to UoSat-OSCAR-14 on my HT. I could hear contacts, but five watts to a whip antenna wasn't enough for QSOs during this hectic weekend.

The AO-40 antenna at K5OE was a commercial-surplus, five-foot dish with a dual-band, circularly-polarized home-brew feed. Power output from the Kenwood TS-2000 and borrowed amplifier on L-band was 28 watts. For the low-Earth-orbit hamsats Jerry and Ron used a small dual-band yagi designed for 70 cm and two meters. A fiberglass, air-conditioned "Scamp" trailer was employed for the operating position. It was much better than the steamy tent of 2002, but there was no room for observers. The Scamp is really small, but it's also easy to air condition. It gets really hot in south Texas over the Field Day weekend.

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***Photo A.** A five-foot dish, dual-band yagi, 10-meter vertical, and a Scamp do it all for K5OE and AG5RS during Field Day 2003. (K5OE photo)*

***Photo B.** An elegant dual-band, circular-patch feed system provides L-band uplink and S-band downlink for AO-40 operation during Field Day 2003 at K5OE. (K5OE photo)*

***Photo C.** Jerry K5OE checks the computer for the next satellite pass while "QØZMO" looks on. (AG5RS photo)*

HAMSATS

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It's a given that there will always be a serious glitch at the beginning of Field Day. A last-minute connector problem almost created a panic, but was quickly cured shortly after the beginning of the event. On the first International Space Station (ISS) pass, Ron AG5RS got a contact with astronaut Ed Lu on his first call. This was Ron's first-ever ISS QSO. Ed asked about Houston weather and was having a great conversation with Ron. Jerry had to bring Ron back to Earth with a nudge or two since there were likely dozens, if not hundreds, of stations hoping for an ISS QSO.

With this early success out of the way, Jerry took over the station and moved on to AO-40. Contacts were brisk. AO-40 was "visible" to hams in North America right at the start of the contest and had crowded conditions for the first several hours. As the afternoon wore on and the "squint" (the angle of the satellite's antennas pointing to Earth) degraded, signals became scarcer, and four hours into the contest all but the hardiest CW operators had moved on to other satellites. Many contacts with Asia, mostly JAs (Japan), were made on Saturday afternoon. AO-40 returned in the early hours of Sunday with a five- to six-hour window of prime operating parameters for North America. Europe was in the window for much of Sunday morning, including stations in France, Germany, Italy, Spain, and the UK giving out DX contacts. By 1700 UTC, though, the squint situation was bad enough that only a few CW signals were heard, mostly on the west coast of the U.S.

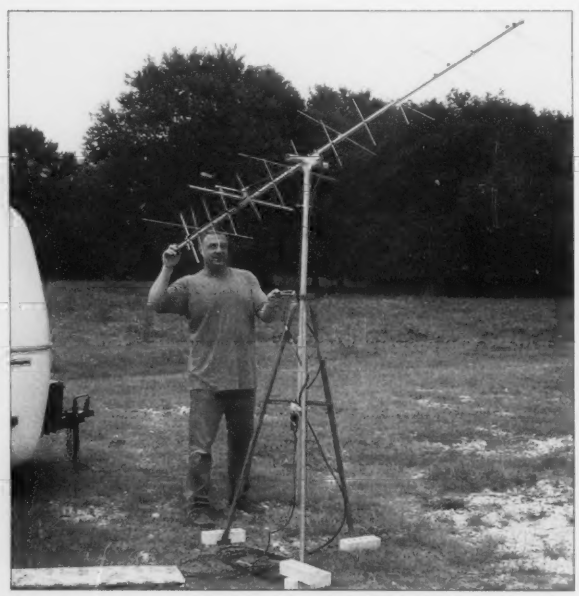

***Photo D.** Ron AG5RS demonstrates the high-tech rotator system on the dual-band yagi (2 meters and 70 cm) during Field Day 2003. (K5OE photo)*

FO-29 provided some excellent contacts for Jerry and Ron on several passes. Many stations found this satellite as a good source of points in the contest. AMRAD-OSCAR-27 (AO-27) and Saudi-OSCAR-50 (SO-50) were good for relatively easy FM contacts. UoSAT-OSCAR-14 (UO-14) was another story. Using 100 watts to the 7-element beam, just one contact was made via UO-14. Only the extremely lucky, high-power stations had success. Bruce KK5DO showed up on a deep-south orbit and gave Jerry and Ron a contact before the rest of the U.S. was in the satellite's footprint. AMSAT rules specify that only one contact is counted for each FM-voice hamsat.

The biggest disappointment for 2003 was the lack of easy digital satellites. UO-22 and the Korean KitSats were missed. Nav-OSCAR-44 (NO-44 or PCSat) was not in range for Saturday activity, and was almost out of range of South Texas when it was finally activated on Sunday morning. While Jerry and Ron were ready for some digital operations, they were out of luck this year.

What's in store for 2004? We'll just have to wait and see. Echo from AMSAT may be in orbit in time for Field Day next year, and there are other satellites waiting for launch to keep things interesting.

AO-40 birthday bash

Beginning September 16, 2003, 0000 UTC and ending November 17, 2003, 0000 UTC, AMSAT is sponsoring a bash to celebrate AO- 40's 3rd birthday. SSB, CW, and digital modes are acceptable for this event. The AO-40 Command Team requests that CW and Digital operations be performed with minimal power (QRP suggested) to keep transponder loading to a minimum.

All hams worldwide are welcome to participate. Awards will be given out for top scores worldwide, stateside, non-stateside, and AMSAT-NA member (with paid up dues). Runners up in each of the above categories will also receive an award. It is possible for one person to get one or more of the awards due to location and score.

The exchange for the bash is callsign, grid square, and AMSAT-NA membership number, or year and month of birth (YYMM) for non-AMSAT-NA members.

Everyone is encouraged to participate and submit a score. E-mail logs will be accepted. All logs must be received by Bruce Paige KK5DO on or before November 30, 2003. If you are not participating in the bash, please send your log as a check log.

Logs from logging programs should be in Cabrillo format or exported in ASCII with the same fields as the paper logs, but may be in the order that the logging program exports them (e.g., SSB might be logged as USB/LSB by the logging program or Grid might be exported before AMSAT #/birthday).

Those participating in the bash are encouraged to submit a weekly total by category so that we can have a running history of activity. These scores will be posted without callsigns so as not to give away who has what score. Please submit the weekly score to [kk5do@amsat.org].

Exchange example:

K5OE de KK5DO

KK5DO de K5OE EL29 12345

K5OE de KK5DO EL29 L3456 (L is used to indicate Life Member)

Or if K5OE were not a member, K5OE EL29 5511

Scoring:

AMSAT-NA Life Member QSO - SSB = 3 points, CW/Digital = 6 points

AMSAT-NA Member QSO - SSB = 2 points, CW/Digital = 4 points

non AMSAT-NA ham QSO - SSB = 1 point, CW/Digital = 2 points

Paper log format:

Date (YYYY/MM/DD), Time (UTC), Callsign, Grid Square, AMSAT #

or birthday (YYMM), SSB/CW, Point Value

2003/10/16, 1400, KK5DO, EL29, L34567, SSB, 3

2003/10/17, 0100, K5OE, EL29, 12345, CW, 4

2003/10/17, 0105, XX1XX, EL01, 5509, USB, 1

Postal submissions address:

Bruce Paige KK5DO

PO Box 310

Alief TX 77411 73

Just Hang 'er Up

continued from page 12

a little tricky. Adjust one band at a time, and then go back and check the SWR on the earlier tuned bands. More trimming or lengthening may be needed. After you have it working correctly, you might consider using epoxy glue or electrical tape to secure the wires to the hangers. Solder all connections at the center insulator and use silicone sealer or electrical tape to protect them from moisture.

You can suspend this antenna horizontally, vertically, or sloping. I found it very easy to support by sloping it between my tower and a small tree. I have worked several DX stations with good reports on all three bands using this antenna. It is a very good DX antenna when used in a vertical configuration. By using it as a sloping dipole, it seems to be much less susceptible to noise than when mounted vertically. Sloping it is the easiest way to suspend and provides best all-around performance. If you are more interested in local and stateside communication, horizontal mounting could possibly work better for you.

This method can be incorporated in the construction of antennas for three or four bands of any desired frequency. It doesn't necessarily have to be made for the WARC bands. It is fun and economical to build and makes a great conversation piece for your antenna farm or garden.

Simple Test Circuits

continued from page 33

in the forward voltage drop and resistance of the diodes. The bridge voltage can be varied with R3, to check the diode's linearity. This feature will allow a dynamic matching of the diodes over a varying current range.

Resistors R1 and R2 may be matched by simply using a digital ohmmeter and selecting two resistors of the same value. The exact resistance value doesn't really matter as long as they are the same.

Using the diode matcher is easy. Select a diode and connect it to either set of test terminals. Set R3 to about midposition and then connect a diode to the other terminals and check the difference voltage on the DVM. Keep trying diodes until the best match is found. To check tracking of the diode pair, vary the applied bridge voltage by rotating R3 about 25% of rotation in both directions. A good matched pair of diodes will usually track within a few millivolts over this range.

The next most often used component we use in project circuitry is the transistor. Over the years, my junk box has become the home of dozens and dozens of orphaned three-lead semiconductors. The majority are either NPN or PNP transistors and the others could be just about anything that comes with three leads. Sorting out a good transistor for a project can be a real hassle sometimes, and our next project eases that chore.

A single 4093 quad 2-input NAND Schmitt trigger performs the active duty in the NPN/PNP transistor tester/sorter circuit. Gate "A" is connected in an astable low-frequency oscillator circuit producing a square-wave output. This output is inverted with gate "D" to supply power to the collector and base inputs of the test fixture. The oscillator's output is twice inverted with gates "B" and "C" to supply power to the emitter input test fixture. This arrangement provides an opposite polarity voltage between the base/emitter and emitter/collector test terminals during test.

Connect a good known NPN transistor to the test fixture and see how the circuit determines which LED will light. During the time gate "A"'s output is "low," the output at gate "D" is "high" and gate "C" is "low." This places a positive voltage at the collector and base test terminals, and a negative voltage at the emitter terminal. A good NPN transistor will be forward-biased and will conduct, lighting the red LED-1. Base current is supplied through S2 and R3 to the test fixture. Opening S2 will remove the base current, which will cause the LED to go dark. A leaking or shorted transistor can cause the LED to stay on or possibly only dim some when S2 is opened.

During the time that gate "A"'s output is "high," the voltages at the transistor's text fixture are of the opposite polarity for an NPN transistor to conduct and neither LED will light. The time that gate "A"'s output is

"high" sets the test circuit voltages up to check PNP transistors. A good PNP transistor will light the green LED-2.

The output test results may be somewhat confusing if the transistor is connected to the test fixture incorrectly. However, for most devices no harm will come during testing. (NOTE: The maximum current will be about 5–7 mA through the device.) I've found the circuit also handy in determining the emitter, base, and collector leads on orphan transistors. Just remember that there are other three-legged semiconductors that are not transistors and cannot be tested with this circuit.

Hopefully one of these simple projects will get you digging into your junk box and building something fun and useful for the shack. 73

Test Time for the SG-2020 Transceiver

continued from page 38

back to your CQ, you had great audio, a really clean signal, but my S-meter didn't move! I had to find out what you were using and what kind of antenna you had." Our exchanges included my QRO level and the fact that the 2020 was feeding my antenna "patch" a B&W wideband dipole at 30 feet facing N/S. So maybe I didn't need the compressor after all. Similar reports of strong, clear, and clean audio are the norm no matter what power level or frequency I operate on, and even with a marginal vertical antenna, I get out, and reports are that my signal has "punch." For more information about "punch," refer to the sidebar that accompanies this review.

• Electronic Keyer: I'm not the biggest CW buff, and I was put off with only Mode B iambic being available. Which leaves me with two choices: (1) use a straight key, or (2) learn to live with iambic Mode B. Not too tough a choice.

Summary:

The SG-2020 may not be everyone's idea of a perfect rig, but for dependability, portability, and a miserly approach to battery consumption, it fits my bill 100%.

I do have some pet gripes about the rig having used it for nearly a year. The first is the antenna "doggle" — anything that hangs free can and at some time will fail. The manual, which is sorely in need of an update, describes the antenna connector as a rear-panel-mounted SO-239 connector, which I wish it still had. My second — actually, if you count the manual, my third — gripe has to do with the Sta-cons or quick-disconnect power connectors. I'd rather have accepted (with reluctance) a doggle with a Molex or, better yet, the new "standard" PowerPole connectors, but this is a matter of preference. And far be it from me to question those folks at SGC for making these decisions.

The ADSP (original) was good, but the new updated ADSP2 is great! I've found that with a bit of fiddling I can get a 20-meter signal so quiet that you'd think the rig had FM capabilities. It's an option; the SG-2020 is available without ADSP, but for around a hundred dollars, why skimp? The rig with ADSP2 is less than $800, and according to their Web site will be shipped free in the US. I did order two options, the underpriced mobile mount and the three-year extended warranty, which I feel is well worth the approximately total $150 it adds to the price. The 2020 is built like a tank, and obviously will be around for many years at our shack and on vacations.

In my infrequent contacts with the factory, I have found them helpful and knowledgeable about my equipment, as well as being ready to answer those dumb questions we all have but are usually afraid to ask. Even if a SG-2020 isn't in the works for you now, I'd suggest that you visit their Web site, [www.sgcworld.com], and check out the rich library of information available for download. These are the same folks who make those antenna couplers, one of which resides in my van. Another came as a special when my SG-2020 was ordered and is in the house waiting for use.

If you want a quality, rugged portable HF rig, the SG-2020 is a gas to use, and delivers what they promise. If it were any more fun to use, someone somewhere would find a way to make it illegal! 73

Study Guides That Pass the Test

continued from page 41

Hathaway; American Technical Society, 1940.

17. *Principles of Radio* (fifth edition) by Henney; John Wiley, 1945.

18. *Fundamentals of Radio* by Jordan, et al.; Everitt, ed.; Prentice-Hall, 1955.

19. *Modern Practical Radio and Television* (in three volumes) by Quarrington; Caxton Publication Co, Ltd.; 1950.

20. *Fundamentals of Radio* by F.E. Terman; McGraw-Hill, 1938.

21. *Basic Radio* (second edition, in six volumes) by Marvin Tepper; Hayden Book Co., 1973; ISBN 0-8104-5921-3.

22. *Practical Radio Communication* (second edition) by Nilson and Hornung; McGraw-Hill, 1943.

23. *Practical Radio Servicing* by Marcus and Levy; McGraw-Hill, 1955.

24. *Old-Time Radios! Restoration and Repair* By Carr; McGraw-Hill, 1991; ISBN 0-8306-3342-1.

25. *Antique Radio Restoration Guide* (second edition) by Johnson; Krause, 1992; ISBN 0-87069-638-6.

26. *Resonance and Alignment* by Rider; John F. Rider Publisher, Inc., 1936.

27. *The How and Why of Radio Apparatus* by Secore; 1922; Reprint Lindsay Publication from 1993; ISBN 1-55918-113-3. 73

Homing In

continued from page 46

patch of woods reported that he was on a dead run."

Family help

I hope your club has tried international-rules foxhunting at least once and is planning to do it again. But even if there is no club nearby, you can get training with just a little assistance. Larry Benko WØQE does it by playing radio hide-and-seek with his young daughter at a local park.

Continued on page 58

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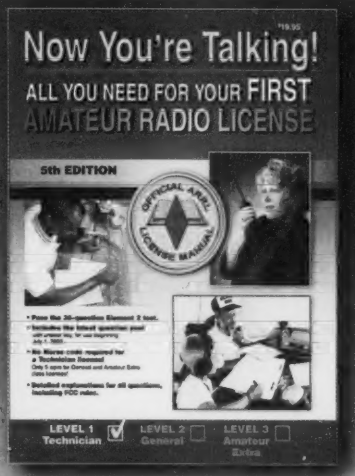
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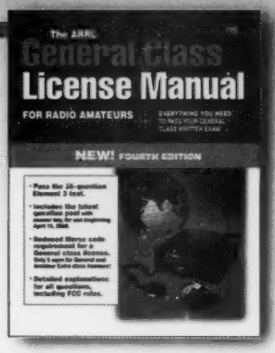

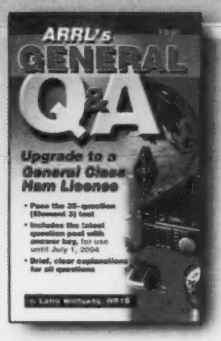

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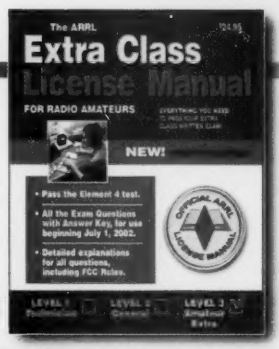
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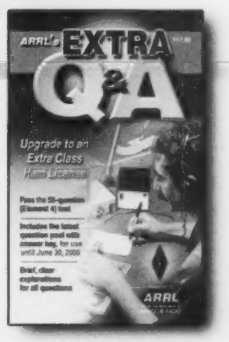

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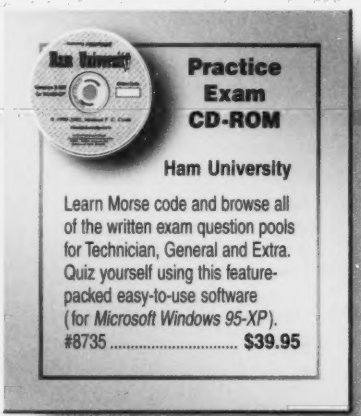
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Fruit Bits

Three morsels from W7RXV's extensive platter — or would that be "patter"?

Shortly after we graduated from high school, our parents were off on another trip courtesy of Uncle Sam. So we, my older brother Hal W7SCR and I, got to watch the house and the dog. Now, the dog had grown up around radio, electronics, and ham radio. You could hide a speaker in one room and call him on it. He always went to you, not the speaker. You couldn't fool him. However, one time I think we got to him.

Corporal — he was an Air Force dog — LOVED to ride in the car — *any* car! Rattle your keys, and he was at the door before you were. One day, Hal and I went for a drive. The dog headed for Hal's station wagon. We turned on the 75m mobiles and the conversion went something like this:

"W7SCR mobile, W7RXV mobile, how copy Hal?"

"Fine business."

"W7SCR mobile, W7RXV mobile, here Corporal, here boy, come on, let's go for a ride. Over."

"W7RXV mobile, W7SCR mobile," Hal was laughing, and I could hear the dog barking since he was just up the road a couple of car lengths in front of me. I could see him running frantically back and forth from the front to the back of the station wagon, sniffing, looking, and barking. Corporal never did figure out how we did that one.

Due to technical difficulties beyond our immediate control ...

More often than we liked, the transmitter would drop out at the low budget radio station where I was chief engineer. One afternoon while I was in the control room, the transmitter dumped. With rapid-fire words, I told the announcer to inform the listeners that we would be back on the air as soon as we fixed the transmitter. Instinctively, he reached for his mic switch and just started to say something when he got a funny look on his face as it clicked with him.

Remotely controlled

My wife once called me at work to tell me that she had gotten a real buy on a new fan and light with remote control for the living room. She would let me install it when I got home. Oh, boy, which wall do we want the switches on? How do you mount that wire mold on the wall? I found it a pleasant surprise to discover that the remote control was a wireless system. Just do a balancing act on a ladder to install the fan, the light kit, and the remote control receiver, then enjoy it.

A few days later when I got home from work, two of our grade-school-age grandchildren were there for a short visit. I started to tell them that they could set the fan and the light as they wished and that it would work from any room in the house, when they interrupted with, "Oh, it works just fine from across the street, Grandpa."

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Are Your Batteries Corroding?

Don't let it eat away at you.

With homeland security in the forefront of our consciousness today, we have been urged to be prepared with flashlights, portable radios, etc. Most of us use batteries in our handie-talkies and pretty much know how to keep them charged. We are generally aware when those batteries will no longer hold a charge and at that time we replace them. But what about those other batteries in our flashlights, tape recorders, smoke detectors, portable radios, test equipment, and alkaline battery packs as backup to HT nicads or nickel-metal-hydride batteries?

Many of us have heeded the recommendations and have obtained the above emergency items and put batteries in them. There used to be a battery company that advertised that their batteries would not leak, but if they did, the battery company would replace your flashlight at no charge; I have not seen or heard this ad in years. In my experience, over time, batteries leak and corrode, whether used or not.

I recently wanted to use a tape recorder to tape a talk, but when I pressed the play button on the recorder, nothing happened. Upon opening the battery case, I found that the batteries had corroded. Since alkaline batteries are chemically a base, using a mild acid can neutralize the corrosion. Most of us have clear vinegar in the kitchen. Vinegar chemically is acidic acid, which is an ideal mild acid. It is very safe to use.

I first removed the battery cells from the holder, and then, dipping a Q-tip into a small bowl of vinegar, I swabbed the contacts with the vinegar. Immediately, when the vinegar touched the corrosion, bubbles started to form; the acid was neutralizing the base. When the bubbles stopped, I noticed that there was still some corrosion left, I again applied more vinegar and the bubbling started again. After repeating the process a number of times, no bubbles were seen when applying fresh vinegar, so I dried the contacts with paper towel and to ensure I had removed all the moisture, I used a hair dryer on low setting to blow-dry any remaining moisture.

The battery contacts were now corrosion free, but the plating of some of the contacts was uneven due to the effects of the corrosion. I then used a fine file to clean up the contacts, inserted new alkaline cells, and the tape recorder played as good as new.

When I finished taping the talk, I removed the batteries because I did not know when I'd need to use the recorder again. I then started thinking about where else I was using batteries. I realized that I use batteries in many places; smoke detectors, cameras, thermostats (for the time clock), flashlights, portable radios, and some test equipment. When I checked the 9-volt batteries in the smoke detectors, most of them read above 8.8 volts and still powered the sounder with a loud volume when I pushed the test button. In spite of that good performance, I replaced those batteries, as older batteries tend to be the ones that corrode first.

Many older hams will still have a VTVM (vacuum tube volt meter) sitting on the shelf. Even though those were designed to operate off 120 VAC (house power), the Ohms circuit uses a 1.5-volt battery. I have seen VTVM batteries corrode if not changed on a regular basis.

Many of the new antenna analyzers are designed to operate from either a wall-wart (AC transformer) or from internal batteries. If you have an MFJ-259 or similar analyzer that you use only occasionally, remove the batteries & place them in a zip-lock type bag so that if they do corrode, your equipment will not be damaged.

If you are a holiday/birthday party shutterbug, your camera probably sits for months without being used in between occasions. It's best to remove the battery from the camera while storing the camera.

Batteries with some service life remaining in them can be used in devices that you use on a daily basis. Depending

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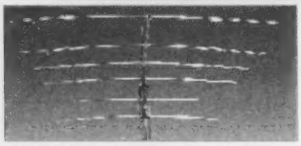

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on your lifestyle, that may include a bedside flashlight or a Walkman-type CD/MP3 player that you listen to while exercising several times per week. The point is that when you are using a battery in active service, you will know when one or more cells go bad by decreased performance of the device. The light in the flashlight will not be as bright; the volume of the CD player will not be as loud, etc. This will give you the clue to check and replace the batteries, which generally will be before corrosion damage occurs. 73

HOMING IN

continued from page 54

"She hides my low-power lightweight transmitter," he wrote. "Then she calls me on my cell phone so I know when to start. Each hunt is usually less than a quarter mile in distance, but I never see her while I'm hunting. When I find the transmitter, she appears out of the bushes, takes the transmitter, hides it again, and calls me three or four minutes later. We repeat this a dozen times or so and then I buy her a treat on the way home."

Larry's practice system is particularly useful if you're testing out a new piece of RDF gear and need some short hunts. For a multiple-transmitter experience, get together with a few fellow hams, pass out the transmitters, and have each one head in a different direction. When each participant has placed a fox, the hunt is on.

How is transmitter hunting developing in your home town? Your photos and stories are welcome. Send them by E-mail or postal mail to the addresses at the beginning of this article.

Notes

1. The championships will be over by the time you read this. "Homing In" will feature a complete report in an upcoming issue. 73

ON THE GO

continued from page 50

more tool to use and for portable operations it just might work out well.

Why operate portable? It can add enjoyment to a vacation. It can take the edge off being out of town for business, and it can certainly give you something to do while the XYL visits with her family. It can be a just-for-fun aspect of our wonderful hobby.

Are you a traveler who operates portable while on the road? Let's hear from the road warriors, RV owners, and others who take a rig along either on a regular basis, or on special occasions. What are your experiences? What has proven to be fun for you? Drop me a line and let me know. 73

QRX

Continued from page 7

S&H green stamps or Texas Gold Stamps?
Mimeograph paper or mimeograph machines?
Telephone numbers that began with a word (e.g., Oxford)?
Metal ice trays with levers?

Did You Know That ... ?

The plastic things on shoelaces are aglets?
The first owner of the Marlboro company died of lung cancer?
All U.S. presidents wore glasses?
Debra Winger was the voice of E.T.?
Pearls will melt in vinegar?
The three most valuable brand names are: Marlboro, Coca Cola, and Budweiser, in that order?

Thanks to The Modulator, *April 2003.* 73

NEVER SAY DIE

continued from page 9

those events took a good deal of planning, the coincidence of one following the other by just a few weeks is almost enough to get a few people thinking.

Worse, the growing number of unexplained (a.k.a. covered-up) anomalies around the 9/11 attack have triggered a growing number of conspiracy sites, many raising legitimate questions. Like? Try [questionsquestions.net]; [911-strike.com]; [unansweredquestions.org]; [whatreallyhappened.com]; [copvcia.com]; [truthnow.com];[ratical.org/ratville/CAH]; [cooperativeresearch.org]; [americanfreepress. net]; [communitycurrency.org/9-11.html]; [thewaronfreedom.com]; [911pi.com]; [tenc.net]; [onlinejournal.com].

The *New Yorker* readers had the benefit of a well-researched article by Peter Boyer pinning down the anthrax used in the October 2001 attack as being American-developed. And then silence descended.

If you've read *Into The Buzzsaw* you are aware of the super cover-up of the Flight 800 crash, plus a bunch of other

cover-ups which reporters have been prevented from airing or publishing.

Then came *You Are Being Lied To,* a big, fat book packed with exposés of cover-ups. Their latest, *Everything You Know Is Wrong* has even more exposés of cover-ups … like Libya being involved with the Flight 103 crash. It was Iran.

So, is the silence about the anthrax scare better than the usual lies?

Hey, they're still lying about the Moon landings, the Roswell crash, the Oklahoma City bomb, UFOs, and on down the list.

QRP?

A letter from Randy Jackson WB6ZFG suggests that I turn *73* into a QRP magazine. Well, I'm not ready for anything quite that radical, but I sure would like to see more QRP articles being submitted. Choke me on them.

How about reviews of QRP equipment? Reports on QRP symposiums? News of any upcoming QRP events? "My most exciting QRP adventure" articles? QRP DXpeditions?

Randy, being Randy, suggests I publish pictures of attractive females using QRP. Sex sells almost anything, so I'm game to help promote QRP with it. Let's get those hormones flowing.

This fits right in with our need to get every licensed ham active with QRP as part of our Homeland Security cooperative plan. Get 'em on the air. Get 'em organized. A yearly Field Day? How about a QRP Field Day every month? How's the last Saturday of every month hit you? Is there a QRP club that might be interested in handling the contest details?

UNICOR

A letter from a federal prison inmate explained that he works two shifts a day for a company called UNICOR. He explains, "This is a totally federally owned private corporation (sounds illegal, doesn't it?). At every federal prison be it high, medium, low, or camp, there is a factory that produces everything from furniture to the electrical harnesses for F-16 fighter aircraft. My job is Head Quality Assurance Inmate and Production Coordinator. It sounds very prestigious, but the truth of the matter is that whenever there is any problem it always falls on my lap. I have always worked all my life and this factory has made me develop considerable people skills. Not everyone is an interested worker. My salary is the highest, plus I have longevities and the advantage of working overtime. I work two shifts, the first from 7:30 a.m. to 3:45 p.m. and the second from 4:00 p.m. to 10:30 p.m. Last month I made $708, but of this half is taken automatically for payment of restitution and fines. My position would be one of at least $100,000 per year, and I assure you that I could justify that amount simply with the improvements made. Well, many people do not understand that this is a business that the government is running. The 125,000 federal prisoners are backed by a 30 billion dollar budget, plus the revenue from UNICOR of approximately $600 million last year. We supply all of the government agencies."

In checking UNICOR on the Web I found that in addition to supplying federal agencies, they're also assisting "private firms to compete for government contracts by purchasing manufacturing time and to subcontract parts and services through UNICOR. Our high-quality, competitively priced labor can translate into more competitive bids and higher profits for your business."

Well, no wonder, with their paying Chinese labor prices, thus helping American companies to compete with foreign labor costs on government contracts.

Zoloft

This is the stuff, like Ritalin, Prozac, etc., that school authorities are forcing parents to give their children. So, I enjoyed reading an ad where the side effects are in about two-point type. The common ones are diarrhea, feeling tired, sleepy, having trouble sleeping, tremor, upset stomach, increased sweating, indigestion, and feeling agitated. For men and women there are sexual problems. Hey, that's a lot better than cutting the kids' sugar intake any day.

Silver

Reader Allen Wiegand says that when he had a sinus attack with sneezing and congestion he put a dropper full of silver colloid in each nostril. It stung a little and then the symptoms cleared up and were gone permanently. And when his dog was scratching his ears and shaking his head Allen put a dropper full of silver colloid in each ear once a day for a couple days. It cleared up the problem.

At around a penny a gallon to make this stuff it's well worth having around. Check out my $37 AC-powered kit.

Beggaring Our Neighbors

Oh, we talk a great line about free markets, but we're lying. Take the $200 billion farm bill, supported by both the

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PROPAGATION

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Propagation Expected to Improve

During the last quarter there has been a moderate surge in the solar indices, but we are well past the peak of Solar Cycle 23, so the upward trend is only temporary.

The rise in sunspot numbers means that the average 10.7 cm flux is likely to stay above 120 for the next month or two; therefore, the Time-Band-Country chart remains unchanged from last autumn. The 10.7 cm flux levels should drop to around 100 by the new year, however.

Solar behavior is expected to range from quiet to active this month, but propagation conditions should be in the Fair (F) range most of the time. Coronal holes and occasional M-class flares will tend to keep the geomagnetic field in flux, but you should be able to find workable DX paths at least two-thirds of the time. The worst periods are forecast to be the 1st–3rd, 13th–16th, and 28th–30th, with Coronal Mass Ejections (CMEs) and/or geomagnetic storms likely.

Geomagnetic storms have long been associated with the autumn and spring equinoxes. While the exact reason is unknown, a study of data collected over the last fifty years suggests that geomagnetic activity is indeed greater near these dates. Between 1940 and 1990, there were forty-two major magnetic storms close to the equinoxes (40% were in March or September), yet none occurred in the solstice months of June and December. Anecdotal evidence of auroral activity, recorded since ancient times, also supports the supposition that geomagnetic storms are more frequent around the first days of spring and fall.

To counterbalance this, the HF bands typically "peak" in the weeks surrounding the equinox, so excellent worldwide communications are possible as long as the sun isn't too turbulent. Although local ionization levels are greatest during summertime in the Northern Hemisphere, research has shown that the worldwide level of F2 ionization is actually up to 50% higher in the fall and

September 2003

SUN	MON	TUE	WED	THU	FRI	SAT
	1 F-P	2 P	3 F-P	4 F	5 F-G	6 G
7 F-P	8 F	9 F	10 F-G	11 F	12 F	13 F-P
14 F	15 F-P	16 F-P	17 F-G	18 F-G	19 F-G	20 F
21 F	22 F-P	23 F-G	24 G	25 F-P	26 G	27 F-G
28 F-P	29 F-P	30 P				

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
Central America	15/17	17/20	17/20	17/20	17/20	15/17	15/17	10/12	10/12	10/12	17/20	10/12
South America	15/17	15/17	20	30/40	30/40			10/12			12/15	12/15
Western Europe	30/40	30/40	17/20	17/20				10/12	10/12	12/15	17/20	17/20
South Africa	20/30	40	20/30	20/30					10/12	10/12	12/15	12/15
Eastern Europe	17/20	30/40	40/80	40/80	30/40			15/17	10/12	15/17	15/17	17/20
Middle East	20	20	20						10/12	10/17	15/17	15/20
India/ Pakistan	17/20	17/20						15/17				
Far East/ Japan	10/12		17/20				17/20	17/20			15/17	10/12
Southeast Asia	15/17		17/20	17/20			17/20	15/17	10/12			15/17
Australia	10/12	17/20	20	20	20	30/40	30/40	17/20				10/12
Alaska	10/12		20				17/20	20			15/17	10/12
Hawaii	10/12	12/15	17/20	17/20	20/30	20/30	17/20	17/20				10/12
Western USA	20/30	20/30	20/30	30/40	30/40			10/12	10/12	10/12	15/17	17/20

CENTRAL UNITED STATES TO:

Central America	15/17	15/17	17/20	17/20	20/30			10/12	15/17	10/12	10/12	10/12
South America	15/17	15/17	20/30	20/30	17/20			10/12			10/12	12/15
Western Europe								12/15	12/15	12/15	17/20	17/20
South Africa			17/20	17/20					12/15	12/15	15/17	17/20
Eastern Europe	30/40	30/40	30/40						12/15	12/15	17/20	17/20
Middle East	20	20							15/17	15/17	15/17	
India/ Pakistan	15/17	17/20						12/15	12/15			
Far East/ Japan	10/12	12/15	17/20	17/20	17/20		17/20	17/20				10/12
Southeast Asia	10/12		15/20	17/20					10/12	10/12		
Australia	10/12	15/17	15/17		17/20	20/30	30/40	17/20			12/15	10/12
Alaska	10/12	12/15	17/20	17/20	20		17/20	17/20				10/12
Hawaii	12/15	15/17	15/17	17/20	17/20	20/30	30/40	17/20		10/12	12/15	12/15

WESTERN UNITED STATES TO:

Central America	10/12	12/15	15/17	17/20	30/40				10/12	10/12	10/12	12/15
South America	10/12	12/15	15/17	17/20	17/20						10/12	10/12
Western Europe	17/20				17/20			17/20	17/20	20	20	20
South Africa	17/20	20		20						10/12	12/15	12/15
Eastern Europe	17/20	17/20							15/17	15/17	17/20	17/20
Middle East	20									15/17	15/17	20
India/ Pakistan		15/17	17/20						12/15	15/17		
Far East/ Japan	10/12	10/12	12/15	17/20	17/20	17/20			17/20			15/17
Southeast Asia	10/12	10/12						17/20	15/17	17/20		
Australia	10/12	12/15	15/17	15/17	17/20	17/20	17/20		17/20			
Alaska	10/12	10/12	15/17	17/20	17/20	17/20		17/20	17/20			15/17
Hawaii	10/12	10/12	12/15	15/17	20/30	20/30	30/40		12/15	10/12		
Eastern USA	20/30	20/30	30/40	30/40	30/40			10/12	12/15	12/15	15/17	17/20

Table 1. *Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.*

spring. There is also less of a potential for over-ionization, so the overall effect is a global improvement in propagation conditions. This seasonal boost is generally limited to the lower bands, however, because September is statistically the peak hurricane month and tropical storms often saturate the upper bands with noise. Fifteen and 20 meters typically benefit most from the "equinox effect," but 10 meters can also provide some strong DX opportunities, especially on north-south paths.

73 and good hunting!

Band-by-Band Forecast

10–12 meters. Conditions will improve throughout the month, and by October most parts of the world should be workable. Look for contacts to the east in the morning hours and to the west in the afternoon. Southeasterly through southwesterly paths will be better than those near the auroral zone, but be sure to check the morning and evening gray-line paths over the poles. Daytime short-skip will normally be somewhere between 1,000 and 2,000 miles.

15–17 meters. Signal strengths will continue to improve as the month passes and long-path propagation should be particularly good. The best openings will still be to Central and South America, especially from early afternoon through mid-evening, but also look for opportunities in Asia and the Far East. Expect skip distances up to 2,300 miles on Good (G) days, but the average will usually be from 1,000 to 2,000 miles.

20 meters. "Twenty" will be your mainstay as usual and can be worked around the clock, but nighttime will be best. Try long-path propagation across the Antarctic into Asia and the Far East and short-path propagation to Australia, Indonesia, and the South Pacific. Short-skip could be as limited as 500 miles during the day, but will normally be from 1,000 up to 2,200 miles at night.

30–40 meters. Hurricane season will make life difficult here, but during the quieter periods there should be some solid DXing opportunities. Central and South America will be your mainstays, of course, but Eastern Europe, Africa, and the Middle East could provide some interesting variety, especially for those east of the Rocky Mountains. Skip will vary between 800 and 2,000 miles at night, but expect only 600 to 800 miles during the day.

80–160 meters. Check these bands when 40 meters is active. Tropical activity will severely curtail activity here, but nocturnal thunderstorms will no longer be as much of a problem as they were during the summer months. Look for peaks just after midnight and again just before sunrise, a situation that pleases both night owls and early risers. Short-skip will normally vary between 900 and 2,000 miles. 73

NEVER SAY DIE

continued from page 59

Dems and Reps, and quickly signed into law by Bush. This raised the level of agricultural subsidies by over 80%, thus encouraging farmers to grow more, increasing our exports and depressing world food prices. This reduces the farm incomes in the developing countries. Three-quarters of the bonanza go to the biggest and richest 10% of the farmers. The rich get richer again, and at the expense of poor farmers here and around the world.

And never mind the growing federal deficit which is driving down the dollar's value.

Oh, did you hear about the imposition of steel tariffs? So much for trade liberalization and promoting development in the world's poorest countries.

Worried Sick

Yes, the things you worry about can make you sick. Okay, so you haven't read Barbara Levine's *Your Body Believes Every Word You Say.* She proves it … over and over.

If you keep saying that you have a poor memory, guess what? If you say you're "sick to death" of something, you just may find you are. Your body doesn't understand it's just a figure of speech, so it tries to follow instructions.

Ten years ago a study showed that women who believed they were prone to heart disease were four times as likely to die as women who didn't.

Just as if you wish for something the universe will often follow through for you, what you say or think about yourself will often become fact. Watch your language.

You can bring about major changes in your body just by being positive. Read the magic formula on page 42 of my *Secret Guide to Health* for the details.

Water!

Are you drinking 8–10 glasses of distilled water every day? Probably not, since 75% of Americans are dehydrated. To get the full story read the Batman's book, *Your Body's Many Cries for Water.* When you feel like a snack, you're thirsty. If you get tired during the day, you're thirsty. Water can ease back and joint pain. Even a small drop in body water hurts short-term memory and ability to do math.

Even five glasses of water a day can cut your chances of getting colon cancer by 45%, breast cancer by 80%, and bladder cancer by 50%.

Please don't drink that stuff from your tap. You don't want any chlorine, fluorides, or any of the other crapola in it. Check [www.steamdistiller.com] for an inexpensive still.

Light

It's been a while since I've nagged you about getting out in the sun every day. I was reminded by a clipping from Ken Glanzer about Dr. Ott developing arthritis. He went to Florida and soaked up the sun for a month, with no improvement. Then suddenly it was gone. He'd sat on his dark glasses and broken them. Read his book *Health and Light* which is reviewed in my *Secret Guide to Wisdom.*

We need those UVs in our eyes if we're going to be healthy. We should be using full-spectrum lighting at home and our offices. It makes a world of difference in schools. No, UVs don't get through our windows or glasses.

The Enron Pikers

American Industry has a lot to learn from our government. The mere fiddling of a few billion dollars by accountants is chicken feed compared to the massive amounts our beloved Congress has been keeping "off the books."

Like? Well there's about $50 billion for the International Monetary Fund that you won't find mentioned in the federal budget. Then there's almost $4 trillion (with a T) for government-sponsored enterprises (GSEs) that are kept off the balance sheet. Oh, there's Social Security, where the revenues go into the Treasury and the liability for payments is off the books, replaced by unreported IOUs.

The real biggee is the numbers you'll only find if you are able to get your hands on the *Comprehensive Annual Fund Reports* (CAFRs) for our cities, counties, states, and the feds. These show that there's over $60 trillion off the books, which is mostly invested in the stock market.

The pre-tax personal income of everyone in the US runs around $6.5 trillion, so our government has been stealing from us and cooking the books way beyond big time.

So, what can we do about all this lying and stealing? Is it hopeless? Dammit,

no! Join the Green Team and swear to never again vote for any incumbent. NRA = Never Re-elect Anyone! Get the politicians out of your state legislatures and Congress. Never elect a lawyer either. Look for business people who have been successful and would like to step in for one term and help get our country away from the corporations and banks that own it and make this a republic again, just as the founding fathers planned.

Breast Feeding

Still more proof of the importance of breast feeding children for you to pass along to your granddaughters or great granddaughters if they're with child. A large Danish study reported in the *JAMA* showed that the longer a child is exclusively breast fed, up to at least nine months, the higher the child's IQ. It has to do the special nutrients in the milk on the baby's developing brain.

Back when I had a bunch of employees I encouraged mothers with babies to keep them with them at work and exclusively breast feed them.

Ozone Good

In a study conducted over a 15-year period, women who worked at home had a 54% higher death rate from cancer than women who worked away from home. How come? It's the daily exposure to household products. Like? Outgassing from carpets, upholstery, drapes, plywood, particleboard, wallpaper, and cleaning supplies. Plus radon gas.

Exposure to these chemicals, most of which were unknown in the home a hundred years ago, has been causing headaches, memory loss, fatigue, drowsiness, dizziness, eye and skin irritation, depression, cancer, shortness of breath, and so on. And yes, of course we're bringing our children up in this poisonous atmosphere.

The solution? Simple, get a small ozone generator. That'll get rid of the bad stuff in no time.

Oops! ... The Return of Talking Plants

Here, in its entirety, is the "Talking Plants" item that last month we neglected to continue from July. Sorry about that!

The American Society of Dowsers quarterly digest had a fascinating reprint of a chapter from a book by Keith Varnum. I'll have to get it and read the whole book.

This had to do with him going to work for Michio Kushi, where he was responsible for a garden about half the size of a football field, where the food was grown for Kushi's East-West Institute in Los Angeles. This was a huge garden to water, fertilize, and weed.

When he complained about the enormity of the task Michio explained, "You know, you don't really have to weed the fields. You can talk to the spirit of the weeds and ask them to grow in balance and harmony with the vegetables."

That's crazy, he thought ... but since everything else Michio he'd tried had worked, what the heck. So he began talking aloud to the weeds, asking them to grow in harmony with the vegetables. Then he also talked to the vegetables, urging them to grow tall and in harmony with their weed neighbors.

After a few weeks he began to see a change. The weeds grew, but not enough to harm the vegetables. Then he started hearing voices in his head. It took him a while to get used to this. They kept telling him that they didn't need fertilizer or water, just his love and company.

So he tried it, even though it hadn't rained for months and the soil was sandy and devoid of nutritional minerals. They explained that he'd have to keep the lack of water a secret from the Institute residents because their belief in the need for water would kill them. So he went to the fields, lay in a hammock and talked to the plants, keeping the illusion alive that he was out there watering and fertilizing the plants.

The plants suggested that he hide the monthly water bill so they wouldn't notice the sharp drop in consumption.

Then they suggested that he plant a separate small garden just for the pests such as snails, bugs, aphids, rabbits, mold, fungi, and deer. When he did this the big garden was no longer bothered and the small special garden was ravaged by every pest there was. The big garden produced record crops.

Michio somehow knew what was going on and smiled.

Our ability to communicate with plants is backed up with Chris Bird's *The Secret Life of Plants* and his *Secrets of the Soil*, both reviewed in my *Secret Guide to Wisdom*. All life is connected, if only we'd take off our mental blinders.

Job Losses

During the 1990s factories were being moved from the cities to small towns, where land and labor was cheaper, putting over 300,000 urban workers on unemployment. Then, as the value of the dollar rose, making imports less expensive, companies started moving their factories from the small towns to lower land and wage countries such as Mexico and China ... with almost 600,000 workers in rural communities losing their jobs, most in the last two years.

American manufacturing jobs have fallen from 35% of the workforce in the 1950s to about 10% now.

With the increasing loss of blue collar jobs there's more and more need for better educated workers ... and our schools are not providing them. We are living in a high-tech world. We're in a world where technologies are radically changing every few years and our educational system, geared to the needs of 1850, has left us woefully unprepared to cope with today's business demands.

Our educational system, and our people, have to come to terms with the world of 2003. The old paradigm of going to school, graduating, finding a job, working for 40 or so years and retiring with a gold watch and a pension are a rapidly fading memory.

When Wal-Mart moves in dozens of local mom and pop stores disappear ... unable to compete on either price or merchandise variety.

Our kids need an educational system that is geared to the realities of the 21st century, not the 19th. We need to get the feds out of the school business. Good grief, didn't we learn anything about the socialist central planning system being a total failure in every country it's been tried? It takes business competition to keep up with the world's changing needs, not well insulated from reality bureaucrats in Washington.

So what's a worker to do? Wake the hell up to reality circa 2003, turn off the TV and make an effort to educate yourself so you'll have some alternatives when the ax falls on your neck. The concept of life long learning is beginning to gradually seep in. As technology advances, we either keep up with it or become superfluous (out of work). Supplying technology updating courses (programs) is going to be a fast-growing industry.

Knowledge is portable. Going to classes? That's 19th-century teaching. Listening to lectures? Har-de-har. Not when information can be delivered via DVD or video tape anywhere in the world from anywhere in the world. A professor at a blackboard? Hey, we have the world of computer graphics and interactive programs now.

Ignorance doesn't cut it. So, how many of the books I've reviewed in my *Secret Guide to Wisdom* have you read so far?

My own shtick is to get people to think in terms of starting their own businesses. Maybe start something with the time that is normally wasted watching

Continued on page 64

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2002 expanded edition (160p). $15 (#04)

The Secret Guide to Wealth: Just as with health, you'll find that you have been suckered by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. $5 (#03)

The Secret Guide to Wisdom: This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. $5 (#02)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. $5 (#10)

Travel Diaries: You can travel amazingly inexpensively – once you know the ropes. Enjoy Sherry and my budget visits to Europe, Russia, and a bunch of other interesting places. How about a first class flight to Munich, a rented Audi, driving to visit Vienna, Krakow in Poland (and the famous salt mines), Prague, back to Munich, and the first class flight home for two, all for under $1,000? Yes, when you know how you can travel inexpensively, and still stay in first class hotels. $5 (#11)

Writer's Guide: It's easy, fun, can pad your résumé, and impress the hell out of your friends. $0 (#78)

Wayne's Caribbean Adventures: My super budget travel stories – where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. $5 (#12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. $5 (#20)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can cut its expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. $5 (#30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like that of Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? $5 (#31)

Moondoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. $5 (#32)

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Reprints of My Editorials from 73. Very few things in this world are as we've been taught, and as they appear. As an iconoclast I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

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My 1992 **We The People Declare War! On Our Lousy Government** book—360 pages and packed with ideas that'll get you all excited. Was $13. While they last $10. Just a few left, found in the warehouse. Last chance for this classic. (#06)

Stuff I didn't write, but you need:

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. $30 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs – such as the ice ages, the Earth being a magnet, the Moon causing the tides, etc. $30 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. $25 (#92)

1982 General Class License Study Guides. Teaches the fundamentals of radio & electricity. Was $7. I found a few in the warehouse. $3, while they last. Great book! (#83)

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The *73* Flea Market, Barter 'n' Buy, costs you peanuts (almost) — comes to 35 cents a word for individual (noncommercial!) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

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This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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NEVER SAY DIE

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ball games or other TV brain-free trivia intended to keep you sitting on the couch, a brewsky in one hand. Like Judge Judy, Texas Justice, sitcoms, quiz, reality shows and so on.

With 300 million potential customers out there, isn't there something you can sell 'em? You don't even have to advertise in magazines or newspapers much anymore, now that we have the Internet.

Crime Deterrent

The Brits tested a bunch of their juvenile prisoners, with one group getting nutritional supplements and the other getting placebos. The improvement in behavior was huge, with the violent offenses committed later dropping by 40% with the supplemented group compared to the placebo-fed group.

That's sure an inexpensive way to cut down on crime.

Do you think there's any way we might be able to get mothers to feed their children nutritional diets? Okay, I'm a hopeless idealist.

Long ago I used to go horseback riding with a young girl whose mother fed her breakfasts of white toast, grape jelly, and coffee. This poor soul had long bouts of depression, lying in bed crying for days, and thinking about suicide. When she got married she fed her daughter similar crapola, so her daughter was a mess, too. 73

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DR-135T MkII

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FM Mobile/Base Transceiver

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